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National Comments regarding the Norwegian data for 2001

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REPORT

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Abstract

This report is part of the Norwegian contribution to the SIME 2003 meeting administrated by OSPAR. JAMP 2001 included the monitoring of contaminants in blue mussels (40 stations) and cod or flatfish (23 stations) along the coast of Norway from Oslo to Bergen, Lofoten and Varangerfjord. The results indicated elevated levels of contaminants, i.e., poorer than Class I in SFT's classification system, or over provisional “high background”, in the inner Oslofjord (PCBs, mercury and lead in cod; PCBs in mussels), Langesundsfjord (HCB in mussels) and Sørfjord and Hardangerfjord (cadmium, lead, mercury and ppDDE in mussels and cod, and PCBs in cod). Significant upward trends were found for mercury in cod from the inner Oslofjord and mussels from the outer Sørfjord and a downward trend was found for cadmium in mussels from Sørfjord/Hardangerfjord. The results from the remaining stations showed low or moderate levels of contamination. The “Pollution" and "Reference" indices for fjord classified the respective groups of fjords as markedly (Cl.III) and moderately (Cl.II) polluted, the same as 2000. The results from studies using biological effects methods in cod (8 stations), flatfish (7 stations) and imposex/intersex in dogwhelks (8 stations) are discussed. Contamination of organotin in mussels and imposex in dogwhelks were still apparent, especially in the Haugesund area. Investigations of deep-water fish from Åkrafjord (reference) and Sørfjord are discussed.

4 keywords, Norwegian	4 keywords, English
1. Miljøgifter	1. Contaminants
2. Organismer	2. Organisms
3. Marin	3. Marine
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WORKING GROUP ON CONCENTRATIONS, TRENDS AND EFFECTS OF SUBSTANCES IN THE MARINE ENVIRONMENT (SIME)

LONDON 18-20 MARCH 2003

O-80106

JOINT ASSESSMENT AND MONITORING PROGRAMME (JAMP)

NATIONAL COMMENTS REGARDING

THE NORWEGIAN DATA FOR 2001

Oslo, 30. January 2003

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Foreword

This report presents the Norwegian national comments on the 2001 investigations for the Joint Assessment and Monitoring Programme (JAMP). JAMP is administered by the Oslo and Paris Commissions (OSPAR) and their Environmental Assessment and Monitoring Committee (ASMO). JAMP receives guidance from the International Council for the Exploration of the Sea (ICES). ASMO has delegated implementation of part of the programme to the Working Group on Concentrations, Trends and Effects of Substances in the Marine Environment (SIME). The Norwegian 2001 investigations are directed to particular JAMP issues relating to contaminants and implemented by SIME. Some JAMP issues to be addressed lack adequate guidelines, in such cases guidelines used by the Joint Monitoring Programme (JMP) were applied.

The Norwegian JAMP for 2001 was carried out by the Norwegian Institute for Water Research (NIVA) by contract from the Norwegian Pollution Control Authority (SFT), (NIVA contract O-80106).

The Norwegian contribution to the JMP/JAMP was initiated by SFT in 1981 as part of the national monitoring programme. It now comprises three areas: the Oslofjord and adjacent areas (Hvaler-Singlefjord area and Langesundsfjord, 1981-), Sørfjord/Hardangerfjord (1983-84, 1987-) and Orkdalsfjord area (1984-89, 1991-93, 1995-96).

Since the North Sea Task Force Monitoring Master Plan was implemented in 1990, additional areas have also been monitored. These include: Arendal, Lista and Bømlo-Sotra areas. On the initiative of SFT and NIVA "reference" or merely diffusely contaminated areas from Bergen to Lofoten have been monitored since 1992 and from Lofoten to the Norwegian-Russian border from 1994.

The comments are presented in accordance with the agreed standardised format (ASMO 1997, Annex 12).

Thanks are due to many colleagues at NIVA, especially: Unni Efraimsen, Åse Kristine Rogne, Sigurd Øxnevad, Tom Tellefsen for field work, sample preparations, data entry; Torgunn Sætre, Alfhild Kringstad, Einar Brevik and colleagues for organic analyses; Norunn Følsvik and Torgunn Sætre for organotin analyses; Bente Hiort Lauritzen and her colleagues for metal analyses; Randi Romstad and her colleagues for biological effects measurements, Gunnar Severinsen for data programme management and operation; and to the authors Ketil Hylland and Anders Ruus (biological effects methods), and Mats Walday (organotin). Thanks go also to the numerous fishermen and their boat crews for which we have had the pleasure of working with.

Oslo,30 January 2003.

Norman W. Green
Project co-ordinator

Contents

1. General Details

1.1 Executive Summary / *Sammendrag*

The Norwegian JAMP 2001 included the monitoring of micropollutants (contaminants) in blue mussels (40 stations including supplementary stations for the Norwegian Index programme and for TBT analyses), dog whelks (8 stations) and fish (23 stations including deep-water species) from the border of Sweden in the south along the coast of Norway to the Bergen area, Lofoten and the Varangerfjord bordering Russia. The results indicated elevated levels of contaminants, higher than Class I in the Norwegian Pollution Control Authority's (SFT's) classification system, or over provisional “high background”). Such cases were found in:

- Part of JAMP area 26: Oslofjord (up to Cl.III for PCBs and mercury, and to a lesser extent lead). Cod liver from the inner Oslofjord was markedly polluted with PCB (Cl.III) even though the annual median concentration was the third lowest registered. A significant upward trend was detected for mercury in cod fillet from both "large" and "small" individuals from the inner Oslofjord 1984-2001.
- Part of JAMP area 26: Langesundsfjord (Cl.III for HCB in mussels).
- JAMP areas 63 and 62: Sørfjord and Hardangerfjord (up to Cl.IV for mercury, DDE and PCB, Cl.III for cadmium, and Cl.II for lead). A significant downward trend was found for cadmium in mussels at four stations in Sørfjord/Hardangerfjord and an upward trend for mercury in mussels at one station in outer Sørfjord 1987-2001.

Two environmental indices have been applied annually since 1995 to assess the levels of contamination in mussels from “polluted” and “reference” areas. The 2001 Pollution Index result was in the class markedly polluted in the Norwegian Pollution Control Authority's (SFT's) classification system. The Reference Index was in the class moderately polluted, as in previous years.

The biological effects methods OH-pyrene (pyrene metabolite), δ-aminolevulinic acid dehydrase (ALA-D), cytochrome P4501A activity (EROD) and metallothionein (MT) were determined in cod from eight stations and flatfish seven stations along the coast from the Oslofjord to the Russian border. Six of the seven flatfish stations were near the cod stations. With respect to OH-pyrene metabolites in 2001, there were somewhat elevated levels at sites where fish are moderately exposed to PAH (Lista and inner Oslofjord). Results for ALA-D indicated exposure to lead of cod from the inner Oslofjord and inner Sørfjord. EROD results for 2001 (and 2000) in cod indicated that the station in Lofoten was least exposed to organochlorines. The EROD-results for cod from Varangerfjord indicated that these fish were more influenced by organochlorines than PAHs, however, no point sources were identified.

The presence of organotin (as TBT) in Norwegian waters was still a problem in 2001, most evident close to harbours. Concentrations of organotin in mussels and dogwhelks were elevated, and biological effects from TBT were found in dogwhelks from all of the investigated areas. There is no clear improvement through the years according to imposex, but concentrations of TBT in mussels were lower than previous years. It is a cause for concern that the ban on the use of TBT in antifouling on vessels <25 m of length has not lead to a clear improvement in the investigated areas.

Concentrations of mercury, lead and pp'-DDE were generally higher in the deep-water fish tusk, ling and rat fish from the contaminated Sørfjord than the reference area (Åkrafjord). Furthermore, in the reference area, concentrations of these contaminants and PCBs were generally higher in tusk and ling than in cod. Year to year variation may mask this tendency in Sørfjord.

Sammendrag

*JAMP (*Joint Assessment and Monitoring Programme*) er et internasjonalt program for miljøovervåking av kystfarvann. Norge er et av tolv land som gjennom Oslo-Pariskonvensjonen (OSPAR) har forpliktet seg til å delta i dette felles overvåkingsprogrammet. Programmet i Norge startet i 1981 og hovedmålsettingen er å overvåke utvikling av miljøgifter i påvirkede områder og ellers langs hele norskekysten. Resultatene fra de minst påvirkede områdene benyttes for å angi "bakgrunnsnivåer". Resultatene rapporteres årlig.*

I 2001 omfattet JAMP undersøkelse av blåskjell (på 40 stasjoner, inkludert de til SFTs forurensningsindeks og stasjoner brukt til overvåking av TBT), purpursnegl (8 stasjoner) og torsk eller flatfisk (23 stasjoner inkludert dypvannsarter) fra svenskegrensen i syd til Bergen, Lofoten og Varangerfjorden mot den russiske grensen. Resultatene tydet på forhøyede konsentrasjoner av miljøgifter, dvs. mer enn Klasse I i SFTs klassifiseringssystem, eller over antatt "høyt bakgrunnsnivå". Disse tilfellene ble registrert i:

- *Oslofjorden med opp til Kl.III for PCB og kvikksølv og i mindre grad bly. Torskelever fra indre Oslofjord var markert forurenset med PCB (Kl.III) selv om median konsentrasjon for 2001 var den tredje laveste i hele undersøkelsesperioden. Signifikant økende trender ble funnet for kvikksølv i torskefilet fra både store og små individer fra indre Oslofjord 1984-2001.*
- *Langesund for HCB (Kl.III for HCB i blåskjell).*
- *Sørfjorden og Hardangerfjorden med opp til Kl.IV for kvikksølv, DDE og PCB, Kl.III for kadmium og Kl.II for bly. En signifikant avtagende trend ble funnet for kadmium i blåskjell på fire stasjoner i Sørfjord/Hardangerfjord og en økende trend for kvikksølv i blåskjell fra en stasjon i ytre Sørfjorden 1987-2001.*

SFTs blåskjell-forurensningsindeks og blåskjell-referanseindeks har blitt brukt årlig siden 1995 på en gruppe "forurensede" og "referanse" fjordområder. Forurensningsindeksen for 2001 betegnet sin gruppe som markert forurenset (Kl.III). Referanseindeksen har klassifisert sin gruppe som moderat forurenset (Kl.II) i hele perioden..

Følgende biologiske effekt-parametre ble undersøkt: OH-pyren (pyren-metabolitt), δ-aminolevulinsyre dehydrase (ALA-D), cytokrom P4501A aktivitet (EROD) og metallotionein (MT). Metodene ble anvendt på torsk fra åtte stasjoner og flatfisk fra syv stasjoner fra syd- og sydvest-Norge til den russiske grense. Seks av de syv flatfiskstasjonene var i nærheten av torskestasjonene. Når det gjelder OH-pyren i 2001, var det noe forhøyede konsentrasjoner i fisk med moderat eksponering til PAH (indre Oslofjord og Lista). Resultatene for ALA-D indikerte bly-eksponering for torsk fra indre Oslofjord og indre Sørfjord. EROD-resultater for 2001 (og 2000) i torsk på stasjonen i Lofoten tydet på minst eksponering til klororganiske forbindelser. EROD-resultatene for torsk fra Varangerfjorden tydet på at disse fisk var mer påvirkede av klororganiske-forbindelser enn PAH, uten at et punkt kilde kunne identifiseres.

Effekter av organotin (bl.a. TBT) kunne fortsatt registreres i 2001, tydeligst i havner eller i områder med mye skipstrafikk. Konsentrasjoner av TBT i blåskjell og purpursnegl var forhøyet, og virkning av TBT (imposex) ble registrert på samtlige stasjoner. Ingen tydelig utvikling i imposex over tid ble registrert, men konsentrasjoner i blåskjell var lavere enn tidligere år. Forbud mot bruk av TBT som begroingshindrende middel på båter <25m i lengde har ikke ført til klar forbedring i de undersøkte områdene.

Konsentrasjoner av kvikksølv, bly og DDE var i hovedsak høyere i dypvanns fiskene brosme, lange og havmus fra Sørfjorden i forhold til referansestasjonen i Åkrafjorden. I tillegg, i referanse området, var konsentrasjonene av disse stoffene samt PCB generelt høyere i brosme og lange enn i torsk. År-til-år variasjoner kan skjule dette forhold i Sørfjorden.

1.2 Introduction

The Norwegian contribution to the "Joint Assessment and Monitoring Programme (JAMP) was initiated by the Norwegian Pollution Control Authority (SFT) and is integrated with SFT's State Pollution Monitoring Programme. The procedures and practice of JAMP has also provided a basis for other investigations of interest to SFT but not necessarily requested by JAMP (e.g. SFT's Index Programme (Pollution and Reference Indices), Chapter 1.3.8).

Data are submitted to ICES under three categories: for Purpose A (health assessment) on a voluntary basis, Purpose C (spatial distribution) on a voluntary basis and Purpose D (temporal trend assessment) on a mandatory basis. Where practical, data collection was in accordance to agreed procedures (OSPAR 1990, 1997). Data were screened and submitted to ICES in accordance with procedures outlined by ICES (1996).

This report focuses on issues and situations in Norway concerning contaminants and considered of interest to the implementation of JAMP (Table 1). It should be noted that these issues are being revised (cf., MON 2001).

Table 1. Extract from list of JAMP issues, subjects and descriptions to which the Norwegian investigations for 2001 can be addressed (cf. ASMO 1997, Annex 30).

Issue	Subject	Description
1.2	Hg, Cd, and Pb	What are the concentrations and fluxes in sediments and biota?
1.3	TBT	To what extent do biological effects occur in the vicinity of major shipping routes, offshore installations, marinas and shipyards?
1.7	PCBs	Do high concentrations pose a risk to the marine ecosystem?
1.8	PCBs	Do high concentrations of non-ortho and mono-ortho CBs in seafood pose a risk to human health?
1.10	PAHs	What are the concentrations in the maritime area?
1.11	PAHs	Do PAHs affect fish and shellfish?
1.12	Other synthetic compounds	How widespread are synthetic organic compounds within the maritime area?
1.15	Chlorinated dioxins and dibenzofurans	What concentrations occur and have the policy goals (for the relevant parts of the maritime area) been met?
1.17	Biological effects of pollutants	Where do pollutants cause deleterious biological effects?
5.3	Chemical used [mariculture]	In which areas do pesticides and antibiotics affect marine biota?
6.1	Ecosystem health	How can ecosystem health be assessed in order to determine the extent of human impact?

This report is structured at the first and second level according to agreed format (ASMO 1997, Annex 12) which *inter alia* presents results before methodology.

1.3 Information on measurements

An overview of JAMP stations in Norway is shown in the tables in Appendix E and maps in Appendix F. The stations and sample counts relevant to the 2001 investigations are noted in the tables in Appendix E. Data reports have been published recently for sediment 1986-1997 (Green *et al.* 2002a) and biota 1981-2001 (Green *et al.* 2002b-d).

Blue mussels were sampled at 40 stations (including supplementary stations for Index and TBT) and fish from 23 stations, including deep-water species, from the border to Sweden in the south to the border to Russia in the north. Generally, mussels are not abundant on the exposed coastline from Lista (south Norway) to the North of Norway. A number of samples were collected from dock areas, buoys or anchor lines.

This chapter focuses on the principle cases where *median* concentrations exceeded provisional "high background" ("normal"). The median concentration can be derived from the tables in Appendix H or figures in Appendix I, depending on the year and concentration basis in question. Where possible, these medians are classified according to the Norwegian Pollution Control Authority's (SFT's) **environmental quality classification system** (cf. Molvær *et al.* 1997). An extract of the system that is applied in this report is shown in Table 6 and includes unofficial conversion to other bases. The system does not cover some contaminants for some species-tissues, however provisional "high background" concentrations have been determined and these are listed in Table 7. "High background" concentrations set the upper limit for Cl.I in SFT's system. The factor by which concentrations exceeded “high background” is termed **overconcentration**. "High background" concentration corresponds to the upper limit to Class I, or insignificantly polluted. Below the median concentrations are assessed according to the SFT system, but where this is not possible overconcentrations are used. The term "significant" refers to the results of a statistical analysis of linear trends shown in Appendix H. More details concerning these terms and methods can be found in Chapter 2.1.2.

1.3.1 Oslofjord area

Mussels from the inner Oslofjord were moderately polluted with ΣPCB-7 (SFT's Cl.II, Figure 1A). Cod liver from the inner Oslofjord was markedly polluted with ΣPCB-7 (Cl.III, Figure 2A). The median concentration in cod liver was 2440 ppb w.w., third lowest recorded for the entire period (1990-2001). Cod liver from the outer Oslofjord was insignificantly polluted (st.36B, Figure 2B).

In 1994, and renewed in 2002, the Norwegian Food Control Authority (SNT) advised not to consume liver of cod from the inner Oslofjord (north of st.31A, see Map 1 in Appendix F) due to concerns about PCB contamination (cf. Table 4).

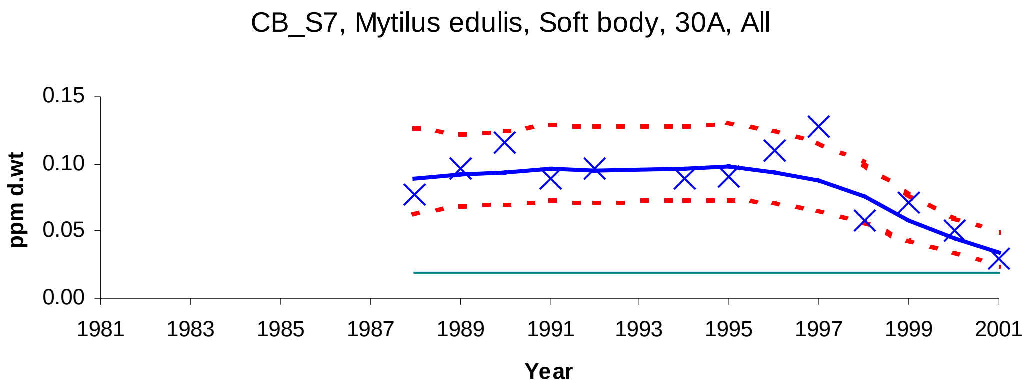
A significant linear *downward* trend was detected (see method description in Chapter 2.1.3) for PCB in mussels from the inner Oslofjord (30A and 31A, Figure 1A, B) for the period 1988 to 2001.

Power analyses (see Chapter 2.1.3) indicated that a hypothetical trend of 10% change per year in ΣPCB-7 concentration in the blue mussel or cod liver from the inner Oslofjord would take 10 to 14 years, respectively, to be detected with 90% significance (Appendix H).

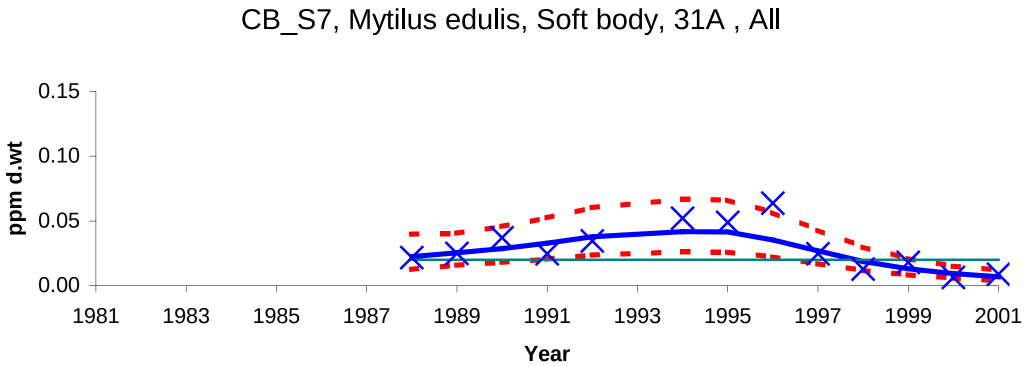
The fillet of “large” cod from the inner Oslofjord was markedly polluted (Cl.III) with mercury and "small" cod were moderately polluted (Cl.II, Figure 3A, B). A significant *upward* trend was detected for the period 1984-2001 for both size groups. "Large" cod from the outer Oslofjord were also moderately polluted with mercury (Figure 3A, B). The power, indicated as number of years to detect a hypothetical 10% change per year for mercury in cod fillet from either station, was slightly better for “small” fish (10-11 years) than “large” fish (13 years) (cf. Appendix H). Concentrations of mercury when considering the entire period were significantly higher in "large" cod compared to "small" cod. Flounder fillet from mid Oslofjord was insignificantly polluted (Cl.I) (st.33B, Appendix H).

Median concentration of lead in cod liver from the inner Oslofjord (30B) was 0.22 ppm w.w. and just over 2 times "high background". The SFT system does not include lead in cod liver.

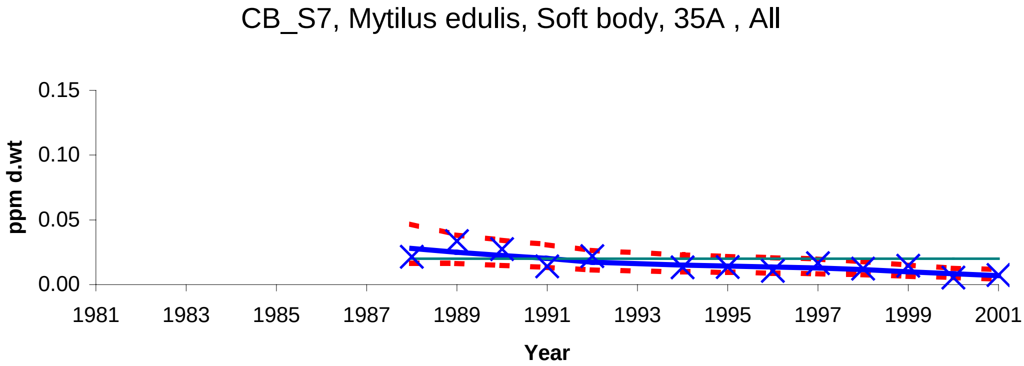
A



B



C



D

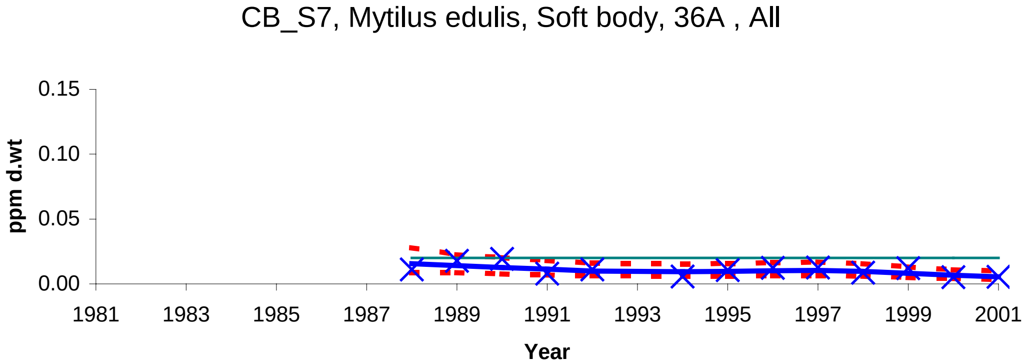


Figure 1. Median CB_S7 (=ΣPCB-7, sum of PCB 28, 52, 101, 118, 138, 153 and 180) concentration in blue mussel (*Mytilus edulis*) from inner (st.30A) to outer (st.36A) Oslofjord. (cf. Appendix F and key in Figure 22, page 43).

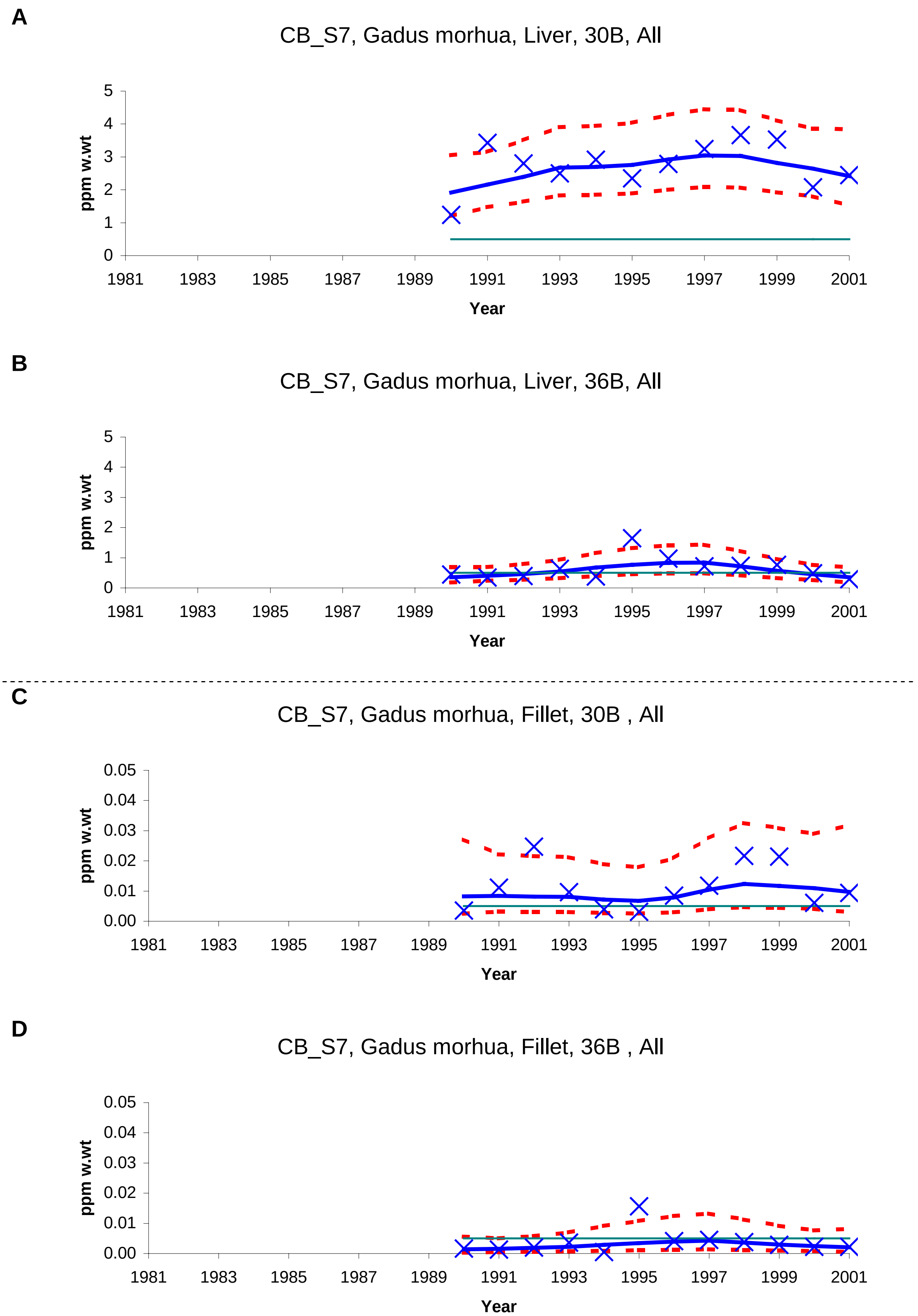


Figure 2. Median CB_S7 (=ΣPCB-7, sum of PCB 28, 52, 101, 118, 138, 153 and 180) concentration in liver and fillet of cod (*Gadus morhua*) from the inner (st.30B) to outer (st.36B) Oslofjord. (cf. Appendix F and key in Figure 22).

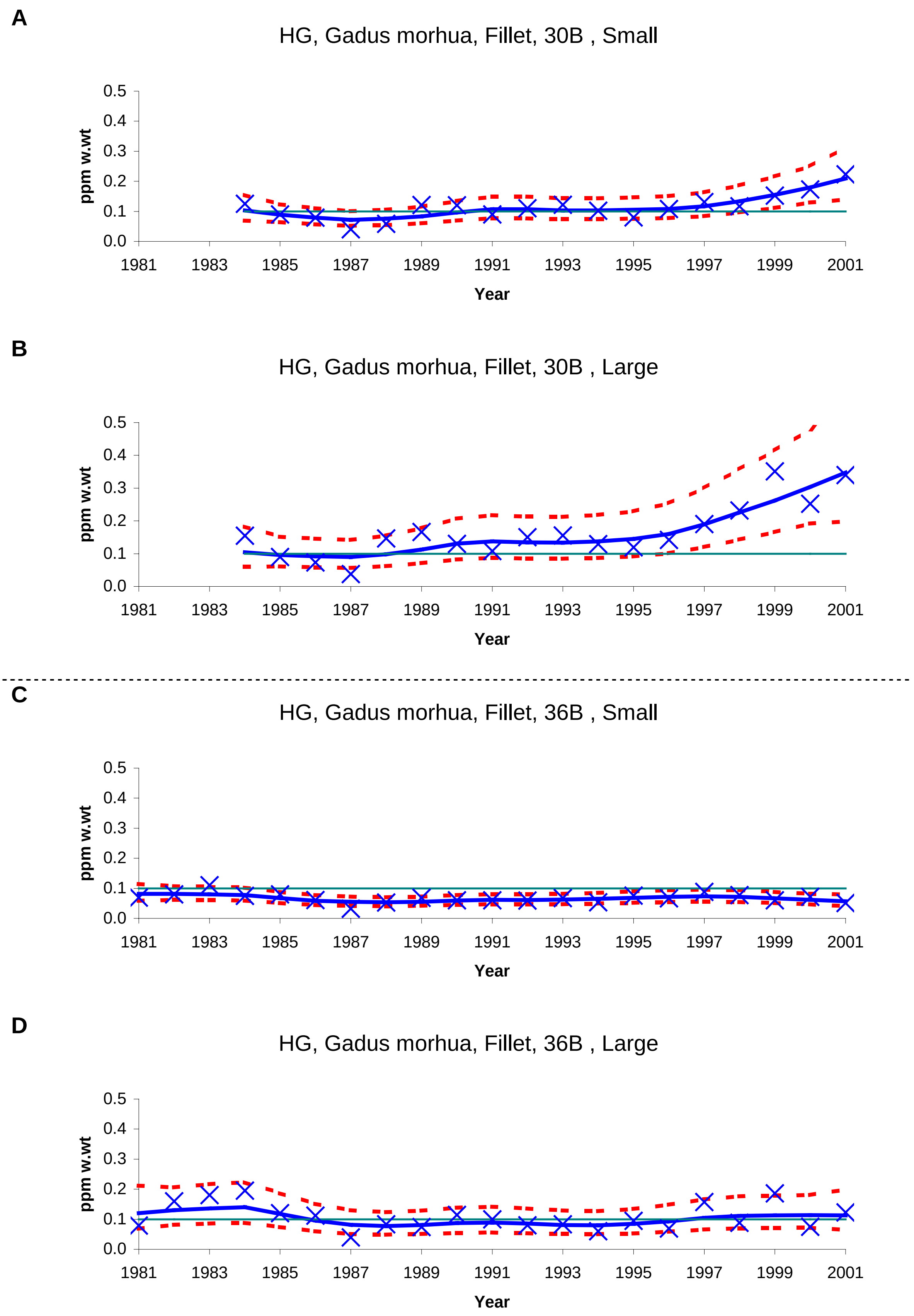


Figure 3. Median mercury (Hg) concentration in fillet of cod (*Gadus morhua*): for the inner Oslofjord (st.30B) "small" (**A**) and "large" (**B**) fish, and for the outer Oslofjord (st.36B) "small" (**C**) and "large" (**D**) fish. (cf. Appendix F and key in Figure 22).

Mussels from Langesundsfjord (st.71A) in 2001 were markedly polluted with HCB (Cl.III, Figure 4). Concentrations have varied greatly during the investigation period (since 1983) but median value have decreased distinctly since 1989 (Figure 4) due to about a 99% reduction in discharge of HCB and other organochlorines from a magnesium factory after 1990 (cf. Knutzen *et al.* 2001).

The variability in the data from Langesundfjord is much less after 1989. The relatively large variability found in this series prior to 1990 accounts for the poor power. The power of the monitoring program for the period 1990-2001 is 14 years and better than the power for the entire period which is over 25 years (cf. Appendix H for entire period). Separate analysis for the 1983-2001 data also indicated no significant trend. The 1990-2001 period had a significant *downward* trend.

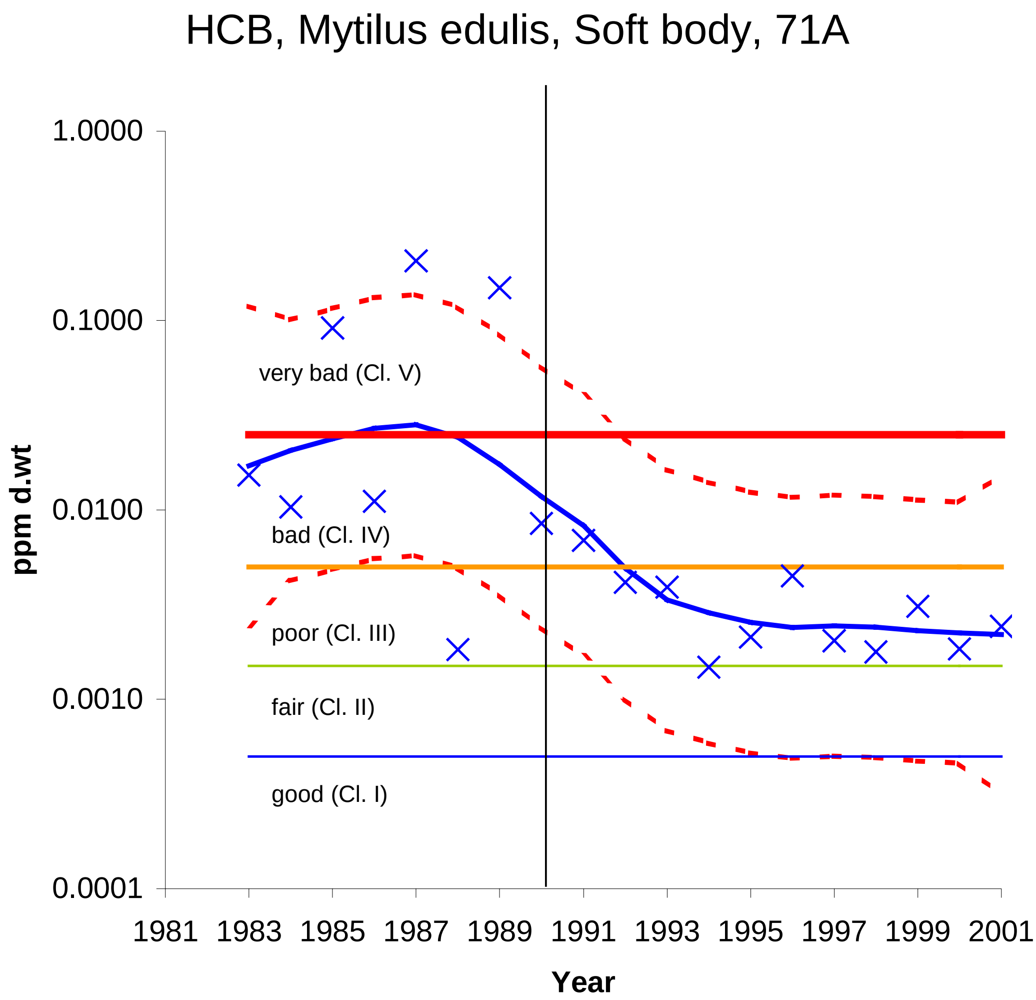


Figure 4. Median HCB concentration in blue mussel (*Mytilus edulis*) from Langesundsfjord (west of Oslofjord). (cf. Appendix F and key in Figure 22). Vertical line indicates when a magnesium factory reduced it's discharge by 99%. Horizontal lines indicate classes as defined in Table 6. **NB: log-scale.**

1.3.2 Sørfjord and Hardangerfjord

The development of the contaminant conditions in these connected fjords and the main remedial actions that have been taken, have been outlined in the national comments for 1989 (Green 1991, Skei *et al.* 1998) and in a recent report concerning Sørfjord in particular (Skei 2000, 2001, Skei & Knutzen 2000). The results from JAMP 2001 are coupled to other studies in this area (cf.. Knutzen & Green 2001a, Ruus & Green 2002) and confirm that the Sørfjord, and in some cases also Hardangerfjord, continue to be contaminated especially with cadmium (Figure 5 and Figure 6), lead, mercury (Figure 7 and Figure 8), ppDDE (Figure 9, Figure 10 and Figure 11) and to a lesser extent PCB (Figure 11, Figure 12 and Figure 13).

Results for mussels collected from the Sørfjord indicated that these were moderately (Cl.II) or markedly polluted (Cl.III) with cadmium in respect to SFT' classification system (Figure 5, Appendix H). Also, concentrations of lead and mercury in these mussels were classified as Cl.II. Mussels as far as Lille Teløy in the Hardangerfjorden (st.69A), over 100 km from the head of Sørfjorden, were moderately polluted with cadmium (Figure 6). A significant *downward* trend was found for cadmium at two station in Sørfjord (st.56A and 57A) and two in Hardangerfjord (st.63A and 65A) (Appendix H). A *downward* trend was found for lead at st. 63A and 65A, 1987-2001, and a significant *upward* trend was found for mercury at st.57A, 1987-2001. In 2001 the Norwegian Food Control Authority (SNT) extended their advice against the consumption of mussels to include all seafood in the Sørfjord including deep-water fish due to concerns about metal and PCB contamination (Table 4).

Cod fillet from "large" individuals is severely polluted with respect to mercury (Cl.IV). The median concentration in 2001 for these individuals was 0.7 ppm w.w. Overconcentrations were found for mercury in fillet in flounder (3-4 times). Overconcentrations were found for cadmium in cod liver and flounder liver from inner Sørfjord (5 and 9 times, respectively). Slight overcentrations of lead in liver for these fish species were also registered.

The power of the sampling strategies for mussels was relatively poor for samples collected from Odda; the innermost part of Sørfjord (st.51A or 52A). For example for lead in mussels, it is estimated that it would take 20-25 years to detect a hypothetical trend of 10% per year with 90% significance (Appendix H). This reflects the large variability found in the data series from this area. The variability is mostly due to the irregular/accidental input of contaminated discharges. The power improved with distance from Odda, and at Ranaskjær (st.63A, ca.50km from Odda) it was only 11 years.

Mussels at one station near the outer Sørfjord were severely polluted with ppDDE (Cl.IV, Figure 9 and Figure 10). The highest median concentration in mussels here (st.56A) was 60 ppb d.w. Just 14-19 km away the mussels were insignificantly or only moderately polluted (Cl.I or II). Cod liver from the Sørfjord was only moderately polluted with ppDDE (Cl.II) (Figure 11, Appendix H).

The source of ppDDE is uncertain. Analyses of supplementary stations (51A, 56A-1, 56A-2 and 57A-1) between 56A and 57A indicated for 1999 that there may be several sources (cf., Green *et al.* 2001a, c). The Sørfjord and Hardangerfjord area has a considerable number of fruit orchards. Earlier use and persistence of DDT and leaching from contaminated soil is probably the main reason for the elevated levels found. DDT products have been prohibited in Norway since 1970 (excepting the dipping of spruce seedling until 1987).

Median concentrations of ΣPCB-7 in mussels at one station in Sørfjord was severe (Cl.IV), 216 ppb d.w. and the highest ever recorded for mussels in this programme (Appendix H and Appendix I). The other three mussels stations were moderately to markedly polluted (Cl.II, Cl.III). Cod liver from Sørfjord was moderately polluted with ΣPCB-7. Samples from Hardangerfjord were insignificantly polluted. During the period 1990-2001, the concentrations for cod have ranged from 100 to 700 ppb w.w., except for the years 1993, 1998 and 2000 where the median values varied between 1500 and 2400 ppb w.w. This indicates that cod is subject to a variable exposure from PCB, but the cause of this variation is not clear. In 2002 the Norwegian Food Control Authority (SNT) has advised against consumption of cod liver from the Sørfjord (Table 4) due to concerns about PCB contamination.

No trends were evident in these organisms for ppDDE and ΣPCB-7 during the period 1990-2001.

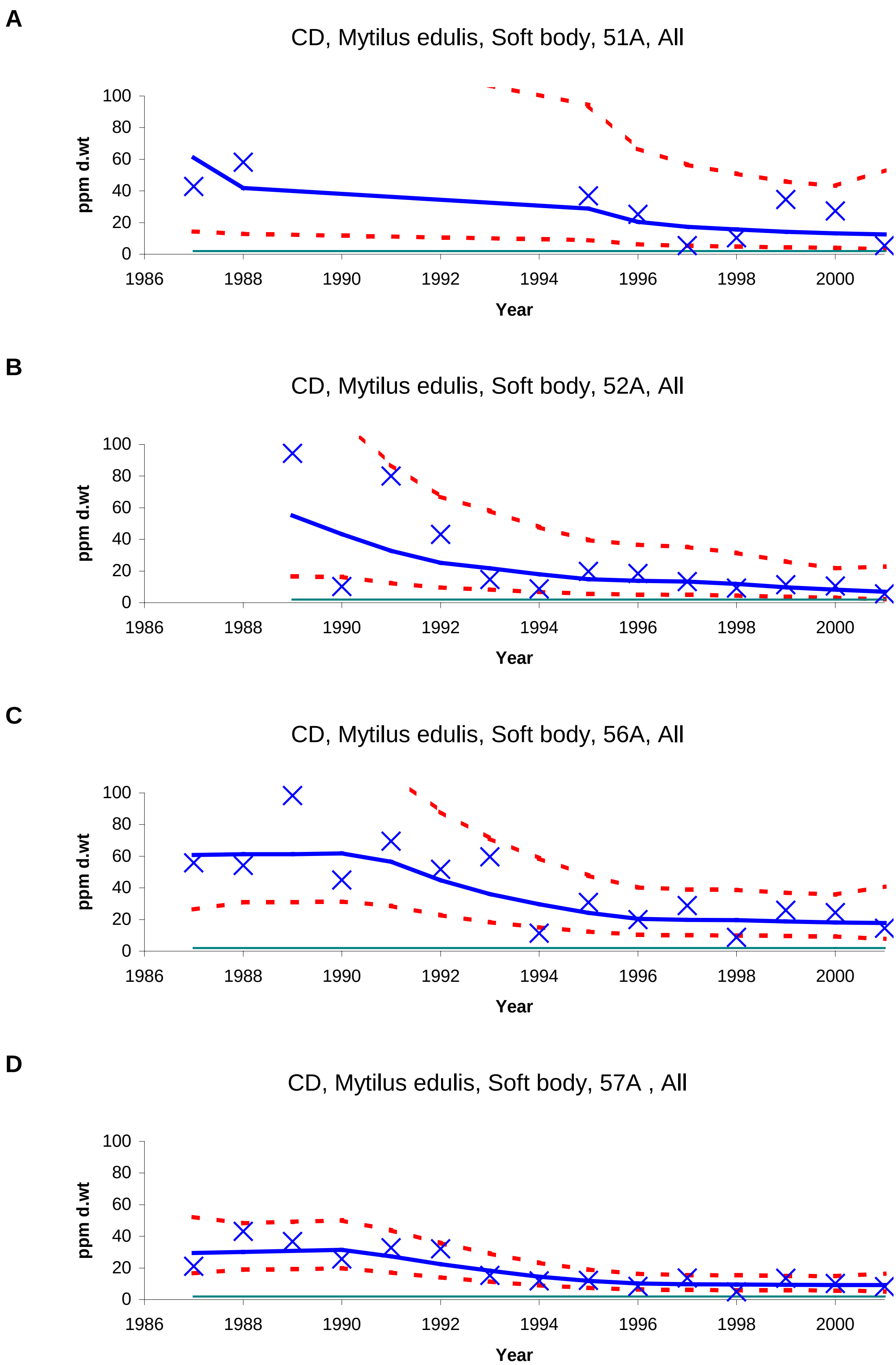


Figure 5. Median cadmium (Cd) concentration in blue mussel (*Mytilus edulis*) from inner (st.51A) to outer (st.57A) Sørfjord. NB: (cf. Appendix F and key in Figure 22). **Note: for some years the upper confidence interval line is off-scale in figures A and B. Note: horizontal line for "high background" near x-axis.**

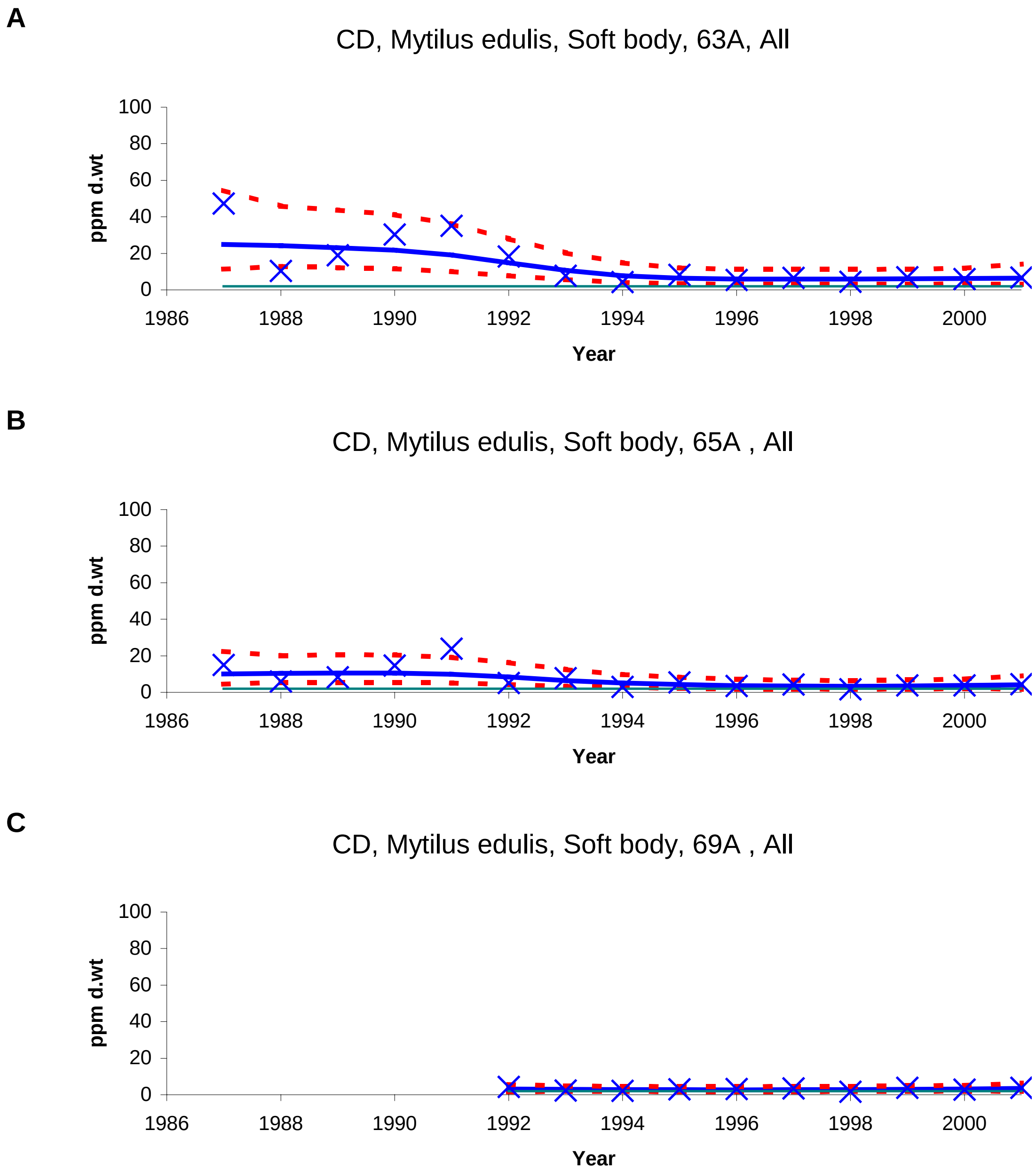


Figure 6. Median cadmium (Cd) concentration in blue mussel (*Mytilus edulis*) from Hardangerfjord (st. 63A, 65A and 69A). (cf. Appendix F and key in Figure 22). **Note: horizontal line for "high background" near x-axis.**

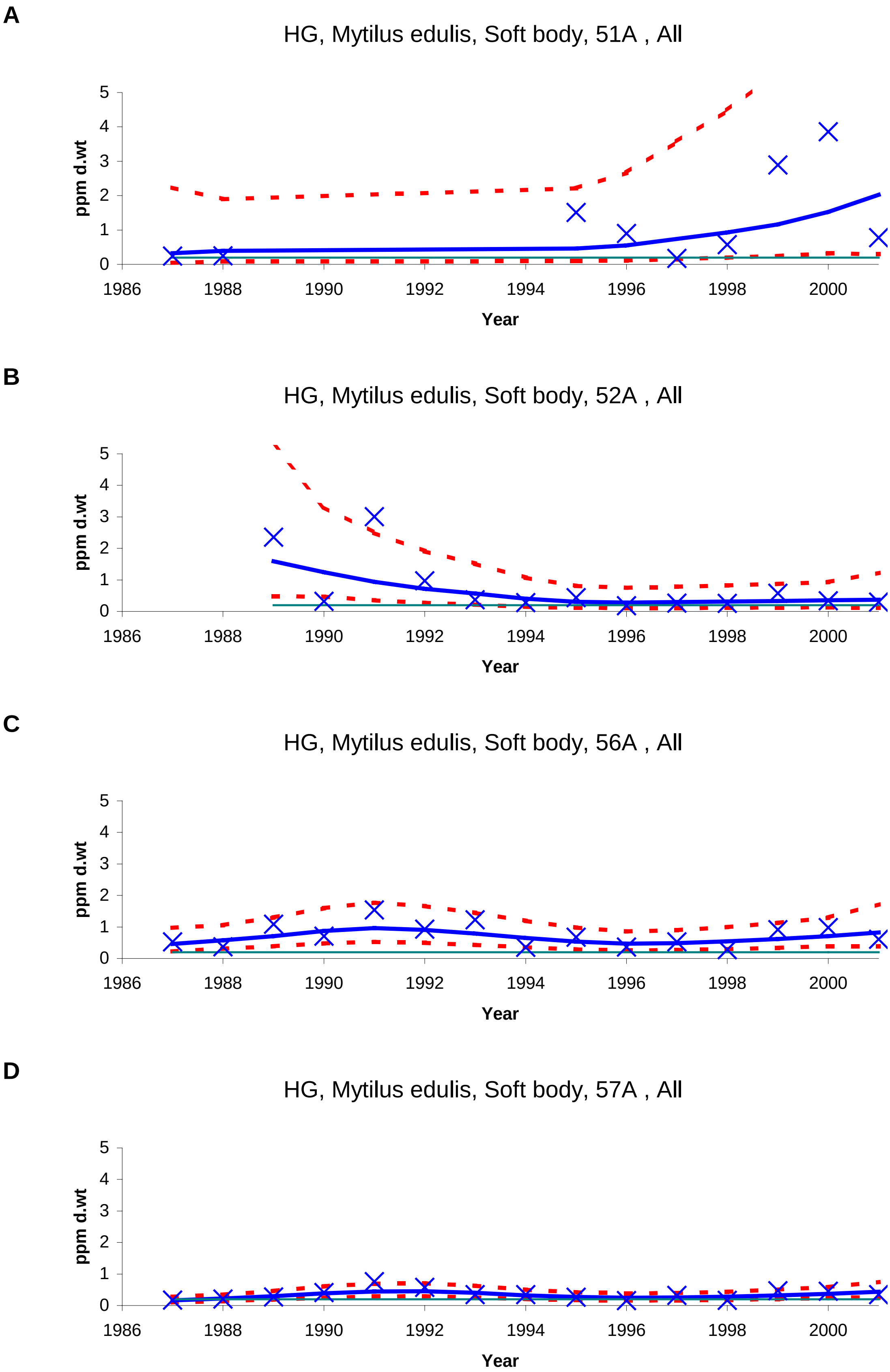
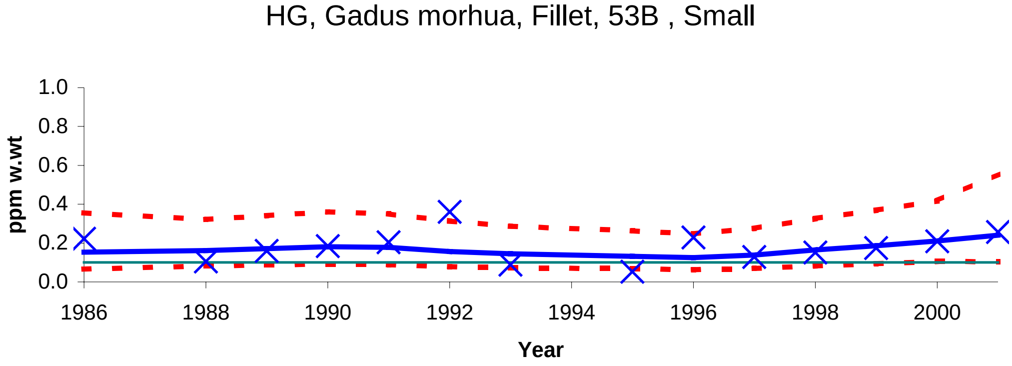
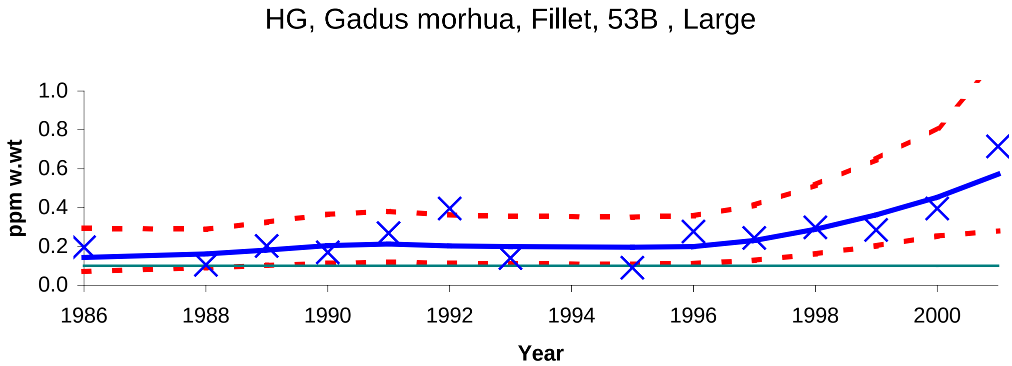


Figure 7. Median mercury (Hg) concentration in blue mussel (*Mytilus edulis*) from inner (st.51A) to outer (st.57A) Sørfjord. (cf. Appendix F and key in Figure 22). **Note: for some years the upper confidence interval line is off-scale in figures A and B. Note: horizontal line for "high background" near x-axis.**

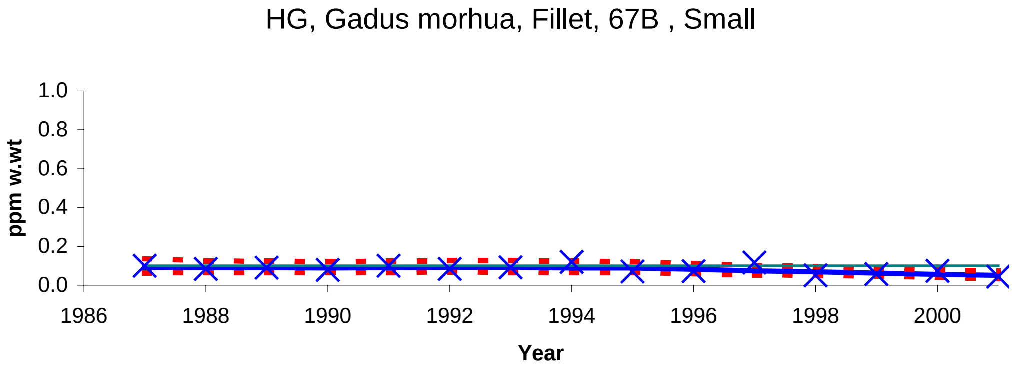
A



B



C



D

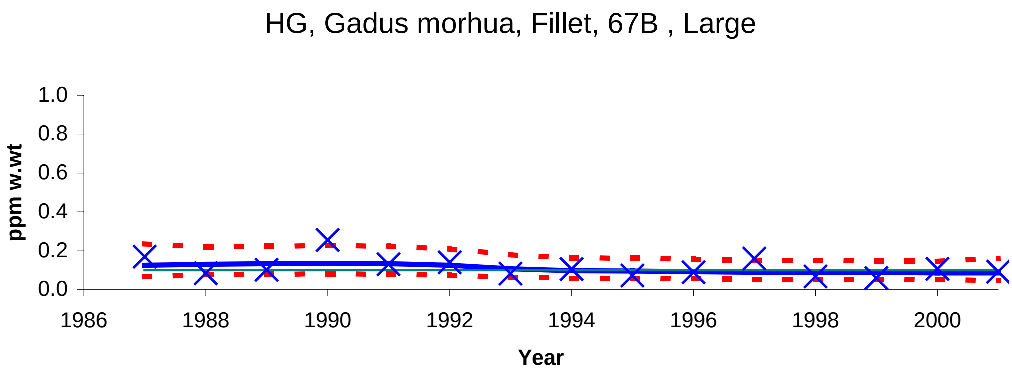


Figure 8. Median mercury (Hg) concentration in fillet of cod (*Gadus morhua*): from Sørfjord (st.53B) for “small” (**A**) and “large” (**B**) fish and Hardangerfjord (st.67B) for “small” (**C**) and “large” (**D**) fish (cf. Appendix F and key in Figure 22).

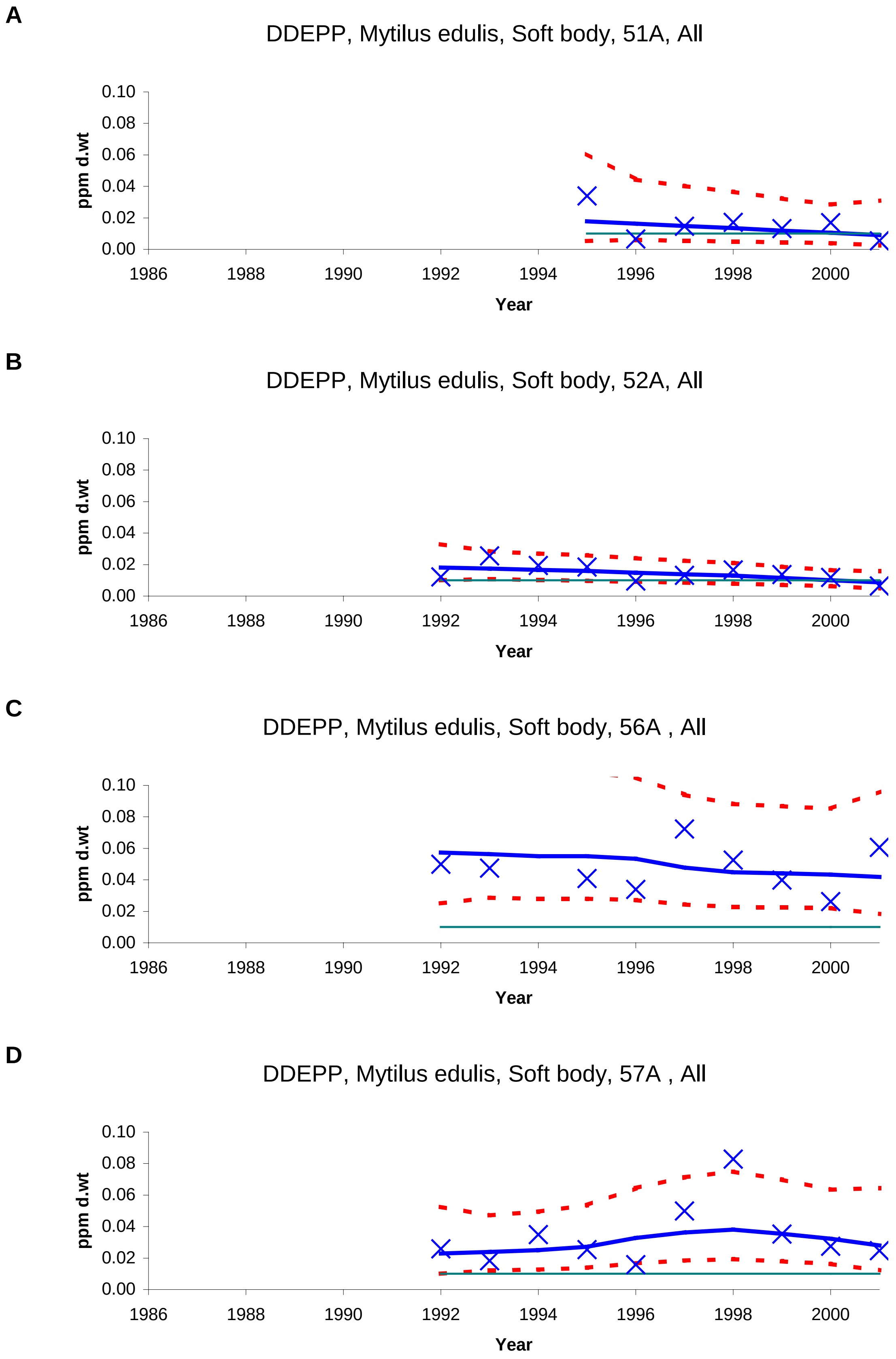
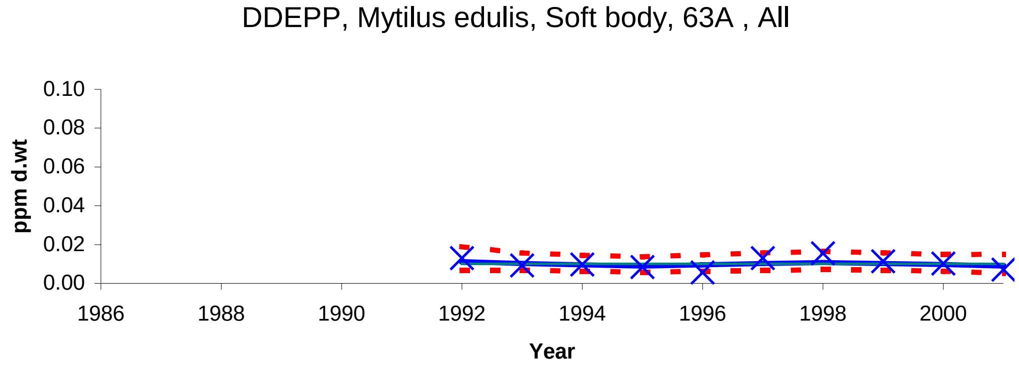
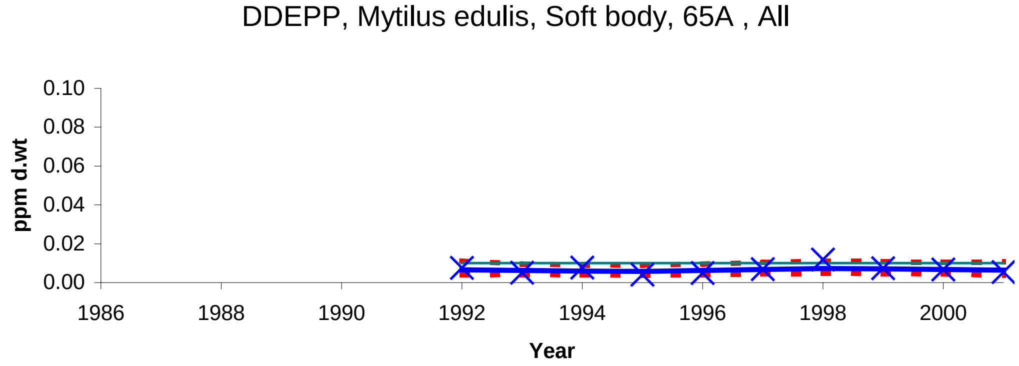


Figure 9. Median ppDDE (DDEPP) concentration in blue mussel (*Mytilus edulis*) from inner (st.51A) to outer (st.57A) Sørfjord. (cf. Appendix F and key in Figure 22). **Note: for some years the upper confidence interval line is off-scale in figure C. Note: horizontal line for "high background" near x-axis.**

A



B



C

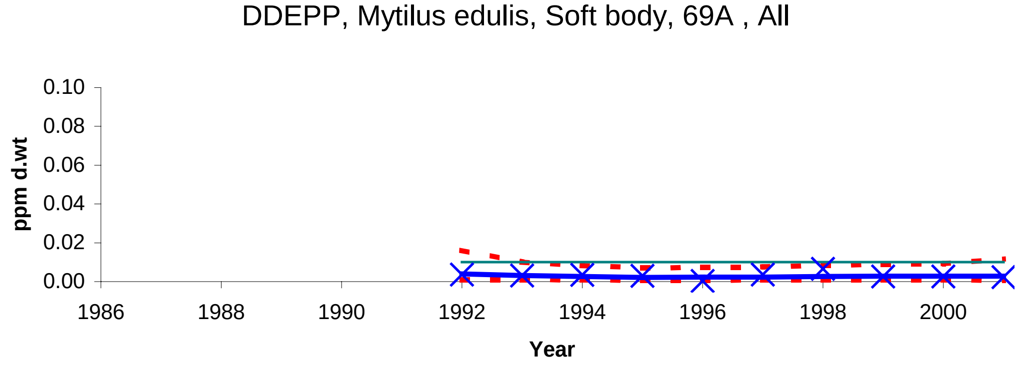


Figure 10. Median ppDDE (DDEPP) concentrations in blue mussel (*Mytilus edulis*) from Hardangerfjord (st. 63A, 65A and 69A). (cf. Appendix F and key in Figure 22). **Note: horizontal line for "high background" near x-axis.**

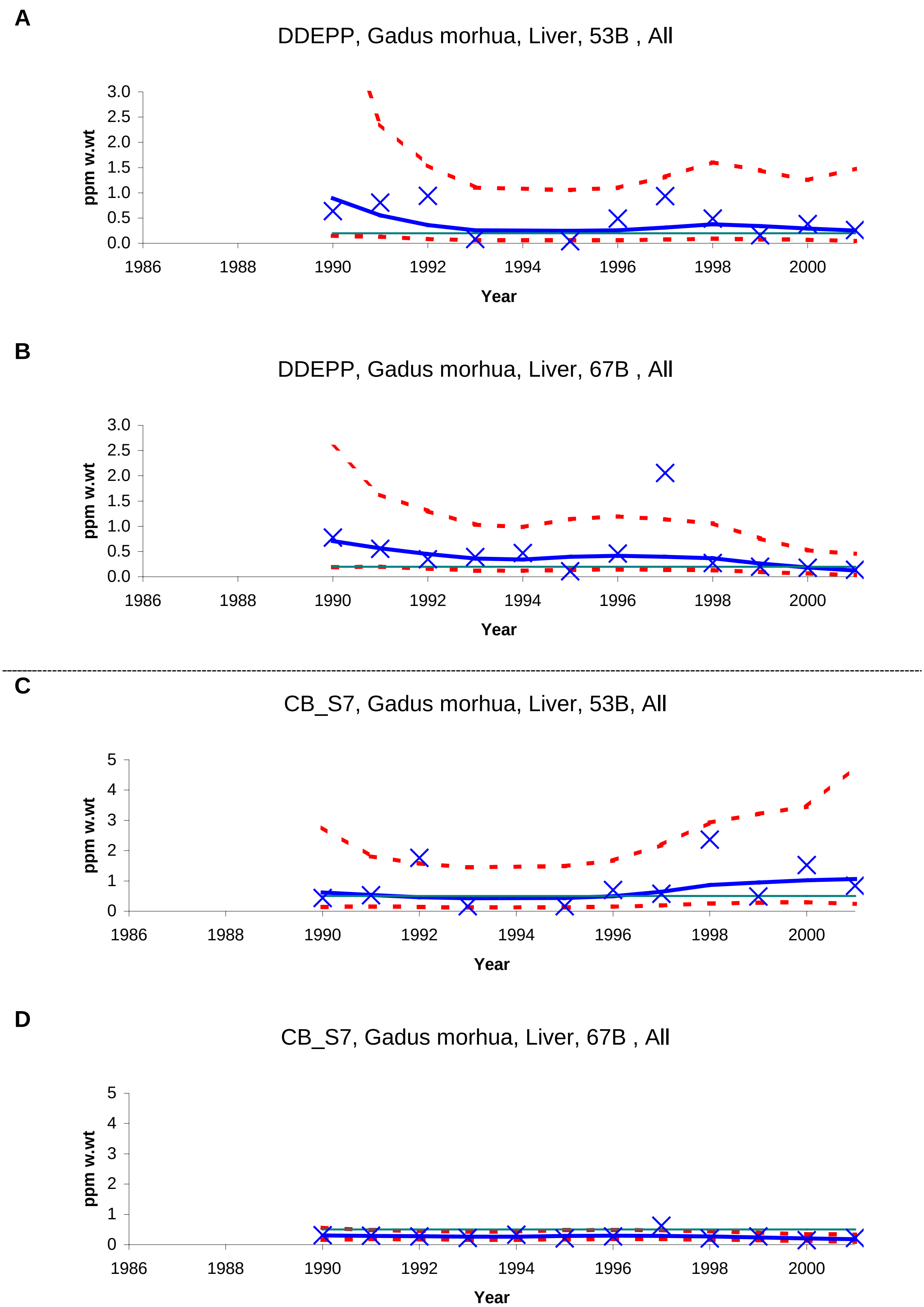


Figure 11. Median ppDDE (DDEPP) and CB_S7 (=ΣPCB-7) concentrations in cod (*Gadus morhua*) from Sørfjord (st.53B) and Hardangerfjord (st.67B) (cf. Appendix F and key in Figure 22). **Note that for some years the upper confidence interval line is off-scale in Figure A.**

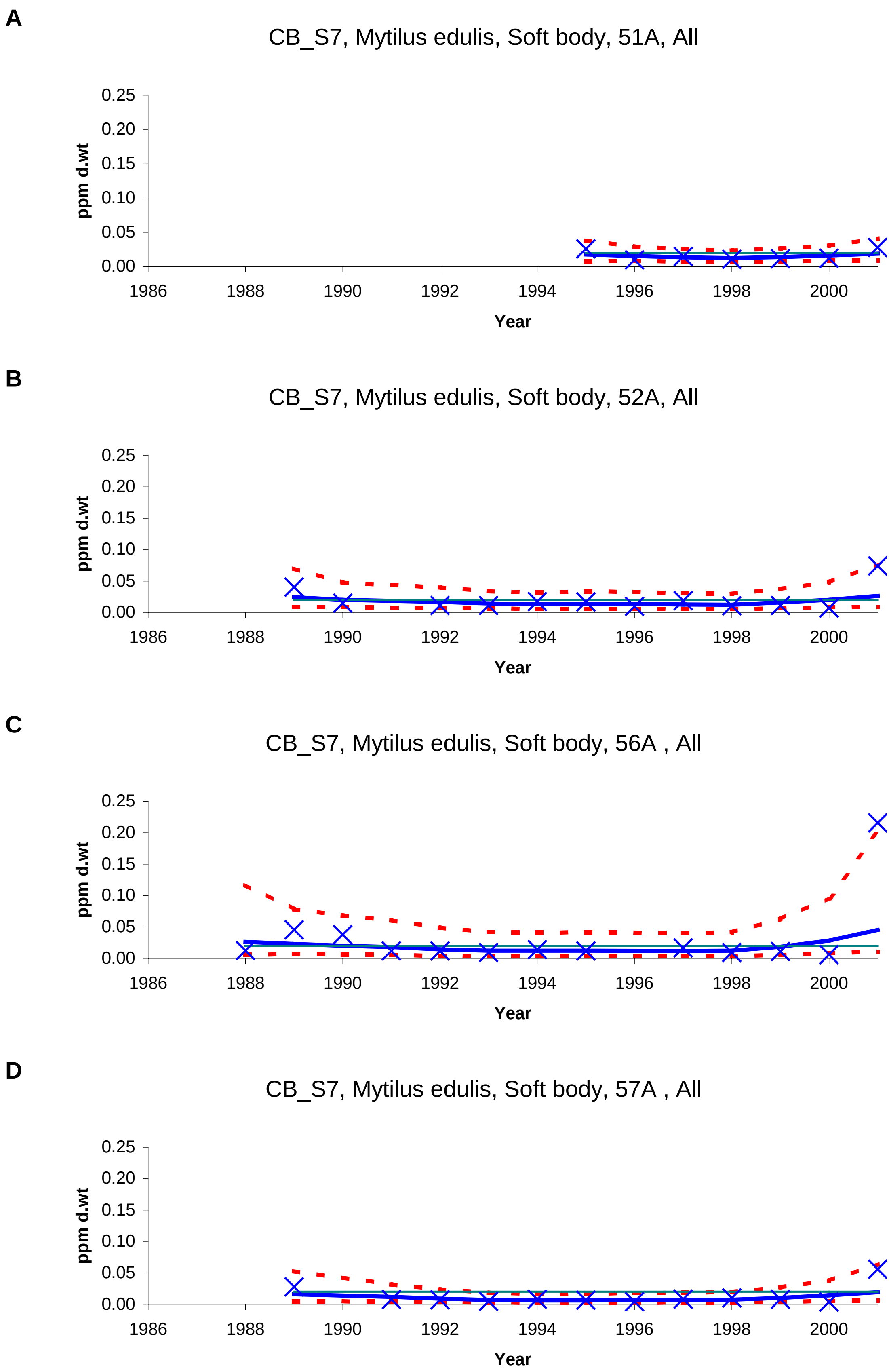
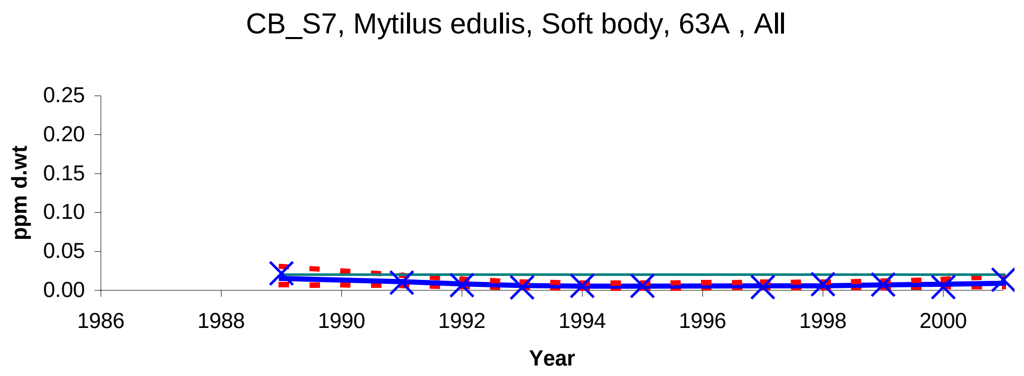
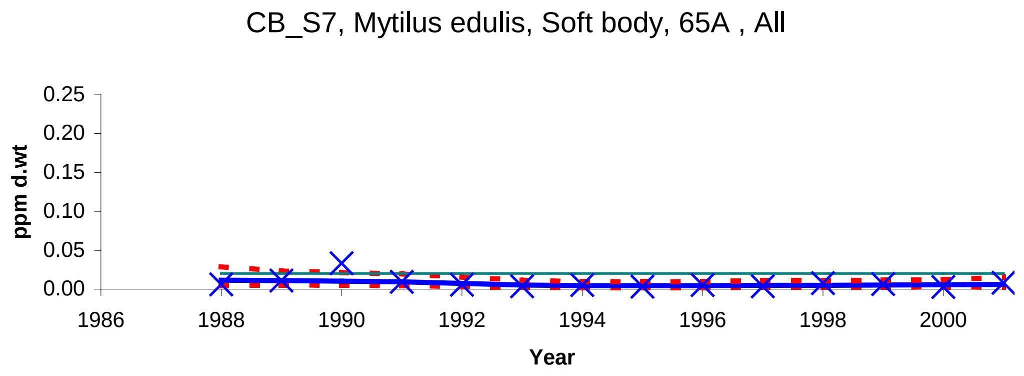


Figure 12. Median CB_S7 (=ΣPCB-7) concentration in blue mussel (*Mytilus edulis*) from inner (st.51A) to outer (st.57A) Sørfjord. (cf. Appendix F and key in Figure 22). **Note: horizontal line for "high background" near x-axis.**

A



B



C

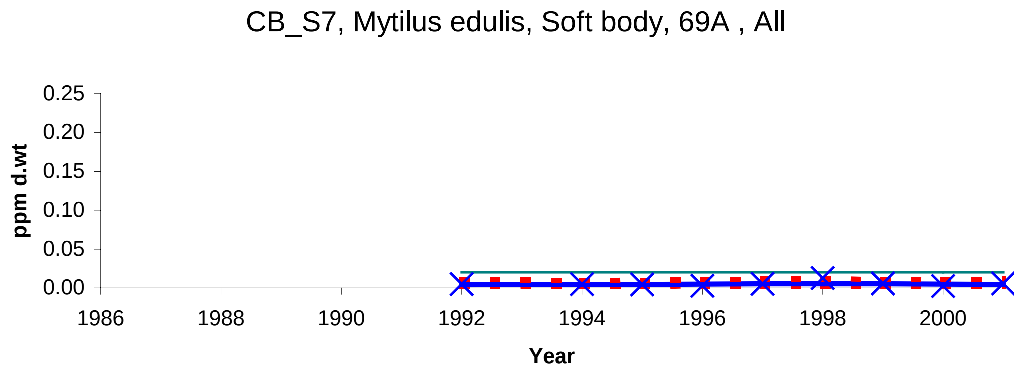


Figure 13. Median CB_S7 (=ΣPCB-7) concentrations in blue mussel (*Mytilus edulis*) from Hardangerfjord (st. 63A, 65A and 69A). (cf. Appendix F and key in Figure 22). **Note: horizontal line for "high background" near x-axis.**

1.3.3 Lista area

Mussels were moderately polluted with cadmium (st.15, Appendix H and Appendix I). An *upward* trend for mussels was found for the period 1990-2001. Slight overconcentrations of cadmium were found in dab liver (st.15F). A slight overconcentration was also found for mercury in fillet of "large" dab.

1.3.4 Bømlo-Sotra area

It was impractical to continue sampling for flatfish at st.22F Borøyfjorden. Thus, a new station in Åkrafjorden, 21F Kyrping, was initiated in 2000. This station is about 82km south-east of 22F, but like 22F, is considered in a reference area.

Mussels from Espevær (st.22A) were moderately polluted with HCBs (Cl.II, Appendix H and Appendix I). Cod and flounder from this area (23B, 21F) were insignificantly polluted or show no signs of overcentrations with respect to metals or organochlorines.

1.3.5 Orkdalsfjord area

Investigations in the area have been discontinued. Data for mussels is available for the period 1984-1996.

1.3.6 Open coast areas from Bergen to Lofoten

This stretch of coastline covers 7° of latitude to 68°N (Appendix F). Only one mussel station (st.98A) was investigated. Mussels were collected from 98A in 1992-1993. However, during the period 1994-1996 mussels were not found at this station but were collected from nearby Skrova harbour (98X). Since 1997 a "new" 98A location was found roughly 18 km north in a small fjord remote from apparent point source of contamination.

In 2001, moderate overconcentrations (2-3 times "high background") of cadmium were found in liver of cod and plaice (st.98B/F) (Appendix H and Appendix I). Mussels were moderately polluted with HCB (Cl.II).

1.3.7 Exposed area of Varangerfjord near the Russian border

The remaining and northern area of JAMP in Norway stretches north of 68°N and a longitude from 17 to 29°E (Appendix F). In 2001 only two mussel stations, one cod and one plaice station were investigated in the Varangerfjord that borders with Russia (at approximately 70°N).

Slight overconcentrations (less than 2 times “high background”) of cadmium were found in liver of cod and plaice (st.10B/F) (Appendix H and Appendix I). Mussels and plaice fillet were moderately polluted with respect to HCB (Cl.II).

1.3.8 Norwegian Pollution and Reference Indices (The Index Programme)

The Norwegian Pollution Control Authority (SFT) has requested a select and small group of indices to assess the quality of the environment with respect to contaminants - The Index Programme. One index is based on the levels and trends of contaminant concentrations in the blue mussel collected annually from a selection of the more contaminated fjords in Norway (Appendix J). SFT has also requested the testing of this index against “reference” stations from selected areas and fjords.

The Index scale varies from 1, when all areas or fjords are insignificantly polluted and would fall into Class I in SFT's environmental quality classification system (Molvær *et al.* 1997), to 5, in which at least one sample from each area or fjord could be classified as extremely polluted or Class V in SFT's system.

Nine fjord areas were used to calculate the Pollution Index. The Index for 2001 is 2.7, down from 2.9 in 2000. A value between 2 and 3 is markedly polluted and corresponds to Cl.III in SFT's system.

Only five fjord areas were included in Reference Index for 1998-2001 compared to seven to eight used in previous years. The Index for 2001 is 1.8 and slightly higher than the 1.5 for 2000. A value between 1 and 2 would be classified as moderately polluted, or Cl.II in SFT's system.

The use of the indices to assess the general level of pollution in contaminated or reference areas of coastal water for the period 1995 to 1999 has been reviewed (Green & Knutzen, 2001). The conclusions were mainly that the sample and analytical strategies lacked adequate coverage of the relevant contaminants and geographical areas. Furthermore, the report suggested supplementing the assessment of this type with relevant analyses of sediment. In 2002 the programme was improved by including more stations and parameters relevant to the blue mussel Pollution Index.

It is not the intent of the application of the indices to give a station by station account, however, after seven years of use (1995-2001) analyses showed some significant trends in mussels (cf. Appendix H). Two cases are listed below where Class II contamination was also found in 2001:

- St.I131, Lastad on the open coast southwest of Kristiansand (Map 4, Appendix F) where an *upward* trend was detected for cadmium.
- St.I1243, Hegreneset in the Bergen harbour region where a *downward* trend was detected for ΣPCB-7.

1.4 Biological effects methods for cod and flatfish

The JAMP-programme for 2001 included five biological effects methods (BEM): FAC, ALA-D, EROD, MT and TBT (Table 2). The first four are discussed in this chapter (Figure 14 to Figure 17, Appendix H and Appendix I) and TBT is discussed separately (cf., Chapter 1.5).

OH-pyrene, ALA-D, EROD and MT were measured in Atlantic cod along the coast from the Oslofjord to the Russian border, and including the Sørfjord and Hardangerfjord area (23B, 30B, 36B, 53B, 67B, 98B, 10B). The same parameters were also measured in flounder at three locations Sørfjord and Hardangerfjord area and the nearby reference area in the Åkrafjord (21F, 53F, 67F), dab at one location in outer Oslofjord (st.36F) and Lista area (15F) and plaice from Lofoten (st.98F) and Varangerfjord (10F). No data from station 15B/F was obtained in 2000. Samples from the inner Oslofjord (st.30B), Sørfjord (53B/F) and Hardangerfjord (67B/F) are considered to be contaminated with metals and organochlorines than the other stations.

Table 2. Summary of biological methods employed by the JAMP-2001.

Code	Name	tissue sampled	Specificity
OH-pyrene	Pyrene metabolite	fish bile	PAH
ALA-D	δ-amino levulinic acid dehydrase inhibition	fish red blood cells	Pb
EROD	Cytochrome P4501A-activity (CYP1A/P4501A1, EROD)	fish liver	planar PCB/PCNs, PAHs, dioxins
MT	Metallothionein	fish liver	Cd Cu Zn (Hg)
TBT	Imposex/Intersex	snail soft tissue	organotin

The reason to use biological effects methods within monitoring programmes is to evaluate whether marine organisms are affected by contaminant inputs. Such knowledge can not be derived from tissue levels of contaminants only. In addition to enable conclusions on the health of marine organisms, some biomarkers assist in the interpretation of contaminant bioaccumulation. The biological effects component of the Norwegian JAMP is possibly the most extensive of its type in Europe and includes imposex in gastropods as well as biomarkers in fish. The four chosen methods for fish were selected for specificity, for robustness and because they are among a limited set of methods proposed by international organisations, including OSPAR and ICES.

The measures derived from OH-pyrene, EROD and MT (cf. Table 2) increase with increased exposure to their respective inducing contaminants. The activity of ALA-D on the other hand is inhibited by contamination (i.e., lead), thus lower activity means higher exposure.

As generally true for previous years, 25 individual cod were sampled for biological effects measurements at each of the eight stations. Similarly, 25 flatfish were collected in Lista area (15F, dab), Hardangerfjord (67F, flounder), Lofoten (98F, plaice) and Varangerfjord (10F, plaice). Twenty dab were sampled in the outer Oslofjord (36F) and only 12 flounder were collected from the Sørfjord (53F). All fish were collected by local fishermen and kept alive until arrival of NIVA staff within 5 days. Obviously, only live fish are sampled. There is an ongoing process to train and inform the fishermen that collect fish for JAMP to ensure the quality of the material.

1.4.1 OH-pyrene metabolites in bile

Detection methods for OH-pyrene have been changed (improved) two times since the initiation of these analyses in the JAMP programme. In 1998 the support/normalisation parameter biliverdin was changed to measurement of light absorbance at 380 nm. Furthermore, in 2000, the use of single-wavelength fluorescence for quantification of OH-pyrene was discontinued and the use of HPLC separation with fluorescence detection was implemented. Although there is a good correlation between results from the two methods they can not be compared directly. The single wavelength fluorescence method is naturally more unspecific and will include fluorescence from more components than the HPLC method, which has extremely high specificity towards individual metabolites. The interpretation of OH-pyrene data is therefore primarily focused towards stations within each year.

The concentrations of OH-pyrene metabolite in bile were significantly higher in cod from station 15B in 1998 and 1999 than the other stations ($p<0.01$, ANOVA on $\log_e$ transformed data (MINITAB release 12.21)) (cf., results in Figure 14). There were no data from this station in 2000, but in 2001 the concentrations of OH-pyrene metabolites in bile from cod were again found highest on station 15B. Dab also showed the highest concentrations of OH-pyrene metabolites in bile at station 15F in 1999 and 2001 (no data in 2000) (Figure 14). Higher concentrations of pyrene metabolites were found in cod from stations 30B and 53B in 1998 - 2000 compared to other locations (besides 15B). In 2001 concentrations were still higher at station 30B, but not at 53B, where the variance was high. Somewhat surprisingly, flatfish (flounder) from the polluted area 53F did not have higher levels of metabolites in bile than flatfish from other locations in either 1999 or 2001. In 2000, however, OH-pyrene concentrations were highest at 53F (no data from 15F that year).

The concentrations of OH-pyrene metabolite in bile of fish (cod and plaice) from station 10B/F were low both in 2000 and 2001. The consistently high levels in cod from station 15B, and probably dab at 15F merits further study. This is an area with a large discharge to water from an aluminium-smelter, the main source of PAH. The fish are collected on the open coast and the discharge from the smelter is a small bay about 2-3 km away.

Bile metabolites of PAH can be detected within a short period (hours) following exposure, and holding conditions prior to sampling may affect results. However, measures were taken in 1998 and 1999 to minimise or remove such exposure. Given the precautions taken, it is unlikely that the observed levels have been caused by storage of fish prior to sampling. The higher levels of pyrene metabolites at stations 53B and 30B compared to the other areas (1998 - 2000) presumably reflect the general contamination of the two areas (inner Sørfjord and inner Oslofjord).

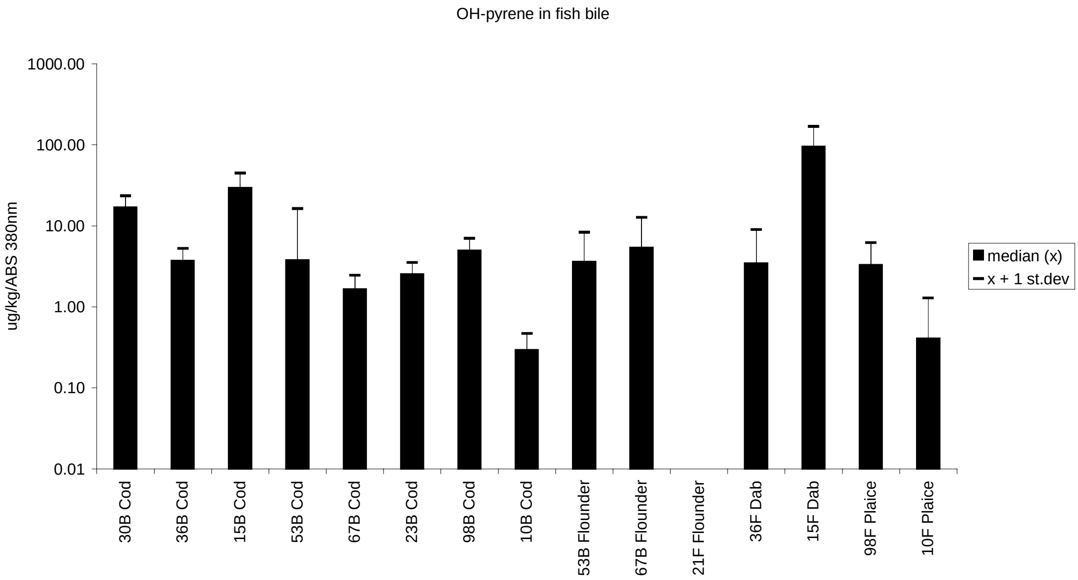


Figure 14. Concentration of OH-pyrene (µg/kg/ABS 380nm) in bile from Atlantic cod , flounder, dab and plaice collected at the indicated stations 2001.

1.4.2 ALA-D in blood cells

Most years the activity of ALA-D in cod was significantly inhibited (indicating the influence of lead contamination) at the two most contaminated stations, i.e. 30B and 53B, compared to cleaner stations (i.e. 36B, 23B, and 10B) for 1997, 1998, 2000 and 2001 (cf. results for 2001 in Figure 15). In 1998, however, the variance was high. For the years 1998-2001 the activity of the enzyme at st.53B in Sørfjord was significantly lower than the less contaminated station 67B in the Hardangerfjord, about 65 km away. In 1997, ALA-D was inhibited in cod from station 67B, presumably due to post-capture exposure (see chapter 1.4.1), and not significantly different from 53B.

In the Oslofjord, cod from the inner part (st.30B) had significantly lower enzyme activity than fish from the outer Oslofjord (st.36B) every year except 1999. In 2001, cod from st.53B had significantly lower activity of the enzyme than cod collected at all the other stations but 30B. At the two new (from 2000) locations (98B and 10B) ALA-D activities were quite similar to those at 36B, both the years 2000 and 2001.

The pattern seen for cod in 1999-2001 was also found in flounder; the activity of ALA-D was significantly lower in fish from the more contaminated station 53F compared to 67F (Figure 15). In 2000, the activity of ALA-D was also significantly lower than the assumed "reference" station 21F (no data from 21F in 2001). Activity in dab from the outer Oslofjord (36F) and Lista area (15F) or in plaice from Lofoten (98F) and Varangerfjord (10F) were similar all years (no data from 98F and 10F in 1999 and 15F in 2000).

The activity of ALA-D is known to be inhibited by exposure to lead. The results indicated that fish from the Sørfjord (st.53B/F) and inner Oslofjord (st.30B) are affected by the exposure to lead. During the period 1998-2001 slight overconcentrations of lead in cod liver have been found in the Sørfjord (1-1.3 times provisional "high background" concentrations) and for the period 1997-2001 in cod from the inner Oslofjord (1-8.5 times, cf. Appendix H). During the period 1997-2001, no overconcentrations were found for cod from Hardangerfjord (67B) or outer Oslofjord (36B). For flounder from the Sørfjord (53F), overconcentrations of 1-1.9 were found during this period but none for flounder from the Hardangerfjord (67F). The results indicate that ALA-D in red blood cells is probably a better indicator of lead-exposure than lead concentration measurements in fish liver.

Although ALA-D inhibition is lead-specific, it is not possible to rule out interference by other metals or organic contaminants. Previous studies indicate that only zinc may ameliorate the effect of lead to some extent, but the effect is variable and weak. Other studies have also shown ALA-D to be a remarkably robust biomarker and factors such as sex, age or season do not appear to affect the response.

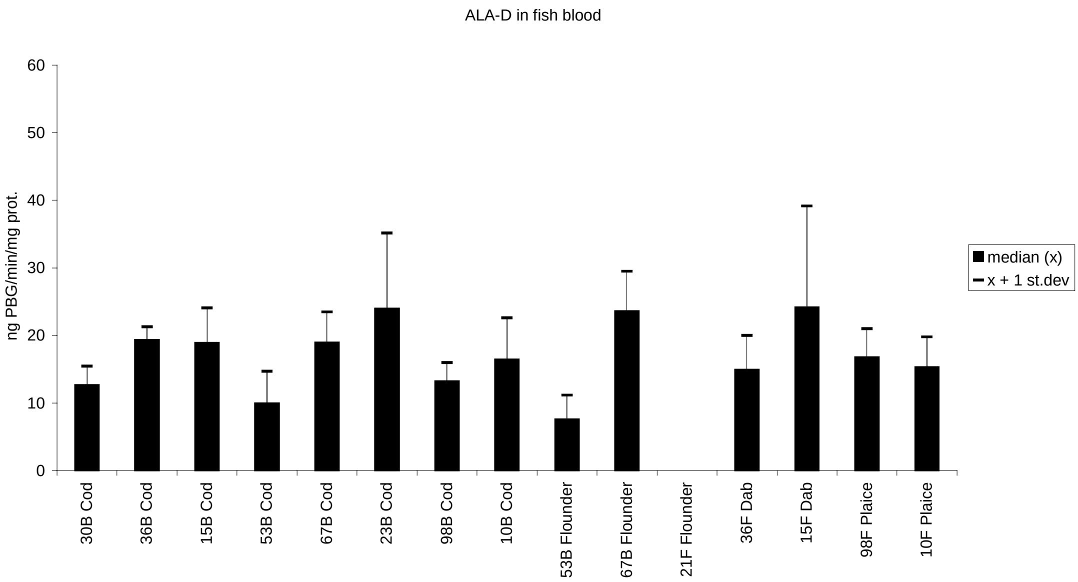


Figure 15. Activity of δ-aminolevulinic acid dehydrase (ALA-D, ng PBG/min/mg protein) in red blood cells from Atlantic cod (A), flounder, dab and plaice collected at the indicated stations 2001.

1.4.3 EROD in liver

High activity of hepatic cytochrome P4501A activity (EROD) indicates a response to the contaminants indicated in Table 2. It was expected that higher activity would be found at the stations that were presumed to be most perturbed by planar PCBs, PCNs, PAHs or dioxins, which were st.30B (inner Oslofjord) and 53B/F (inner Sørfjord). However, EROD activity at these stations were not consistently higher than at other stations. The median value in cod from st.53B for 2002 was next lowest.

It is known that EROD activity can be influenced by gender (at least at certain times of the year). However, no clear differences could be seen between sexes for any years at any stations.

In 2001 EROD activity in cod was fairly similar at all stations except 98B, where the activity was less than half of that at the other stations. EROD activity was low in cod from this station also in 2000 (cf. Appendix I and results for 2001 in Figure 16).

EROD activity in cod from 15B was the lowest in 1997 and the highest in 1999. The median concentration was about three times 1997-1998 and 2001 values (Appendix H). As mentioned above, an exposure to PAHs is indicated for this cod population (15B), and may, periodically, affect the activity in this species. Unfortunately, no data were obtained from station 15B/F in 2000 to see if the elevated EROD activities were sustained.

The 1999-2001 results for dab (st. 36F and 15F) and plaice (st. 98F and 10F) were generally similar to each other but higher than for flounder (st. 53F, 67F and 21F) except in 2001, when EROD activity in flounder at station 53F (Sørfjord) were approximately the same as the EROD activity in plaice (st. 98F and 10F) (cf. , Figure 16). In 1999-2000, no significant difference was found in flounder from the more polluted st.53F in the Sørfjord compared to st.67F in the Hardangerfjord about 65 km away. In 2001, however, the median hepatic EROD activity in Sørfjord flounder was more than five times higher than in Hardangerfjord flounder.

Data from 2000 and 2001 also indicate somewhat higher EROD and lower OH-pyrene in both cod and plaice from Varangerfjord (10B/F) compared to Svolvær (98B/F). Both areas are considered to be diffusely contaminated. This indicates that the fish from Varangerfjord are possibly more exposed to organochlorine contaminants than PAHs, whereas the opposite is found for fish from Svolvær. PCB-data from 1995 have shown great variations in liver concentrations in cod, indicating variable exposure for cod in the Varanger area. EROD activities in cod from Lofoten (98B) were the lowest recorded in this investigation (both 2000 and 2001) and may indicate "background" activity.

No adjustment for water temperature has been made. Fish are sampled at the same time of year (September-November) when differences between the sexes should be at a minimum. Unpublished analyses indicated no clear difference in activity between the sexes. Generally, higher activity was found at more contaminated stations, but the response was inconsistent. This inconsistency might indicate that populations with variable exposure history are sampled. Besides, there is evidence from other fish species that continuous exposure to e.g. PCBs may cause adaptation, i.e. decreased EROD response.

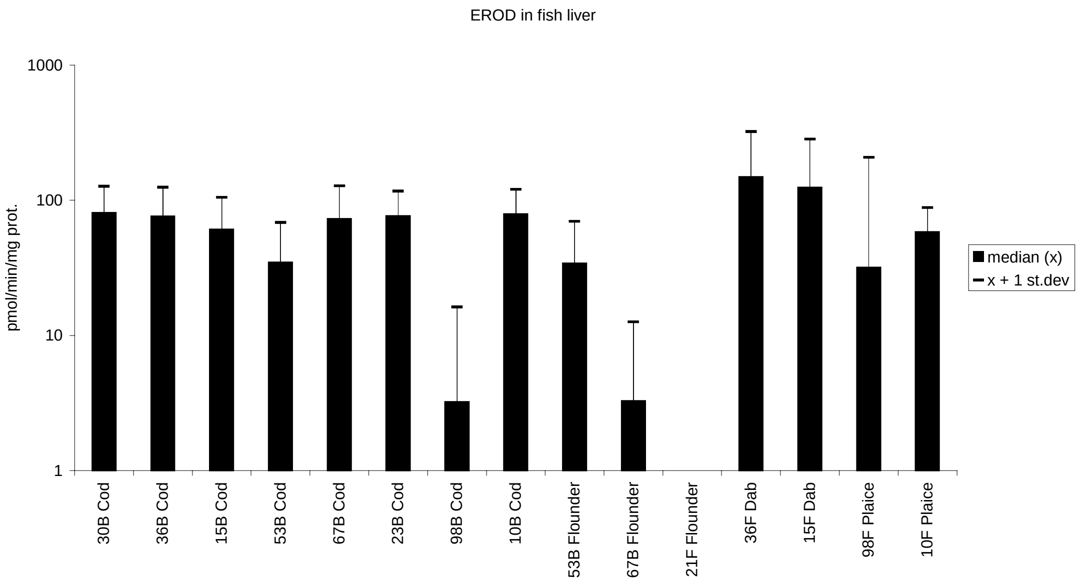


Figure 16. Activity of cytochrome P4501A (EROD, pmol/min/mg protein) in liver from Atlantic cod, flounder, dab and plaice collected at the indicated stations 2001.

1.4.4 Metallothionein in liver

As indicated earlier (Green *et al.* 2002e), 1997-1999 samples have been reanalysed for metallothionein using differential pulse polarography (DPP). Thus, the same method has been used for all samples from all years and temporal comparisons can be made.

There were no clear trends in the hepatic concentrations of the metal-binding protein metallothionein (MT) in cod from the eight stations for the period 1997-2001 and in flounder from three stations 1999-2001. However, a number of unexpected relations between MT-levels at different stations were recorded:

For flounder, MT-concentrations in 1999, 2000 and 2001 were unexpectedly and significantly higher at st.67F in Hardangerfjord, than st.53F in the Sørfjord (Figure 17, Appendix I).

MT-levels in plaice from 10F and 98F (2000 and 2001) were approximately the same as in dab at 36F (2000 and 2001) and 15F (2001).

Metallothionein is a protein that is induced by and binds the metals cadmium, zinc, copper and mercury, and differences in median metal concentration should indicate differences in exposure. However, presumed gradient in metal exposures, such as decreasing from the inner Oslofjord to the outer Oslofjord and likewise from the Sørfjord to the Hardangerfjord (cf. Appendix I), did not correspond well with differences in metallothionein. More often than not the opposite was observed in cod and flounder for the period 1999 to 2001. The reason for this may require a more detailed analysis.

The response in metallothionein thus largely appear to reflect hepatic metal levels. In general, exposure to relevant metals such as cadmium, zinc and copper does not appear to be strong in the areas studied.

It must be noted that no adjustment has been made for sex, size or metal levels in tissues. Other than metals, the above factors would not be expected to have strong effects given the sampling programme used. Differences between species have to be considered if different areas are compared.

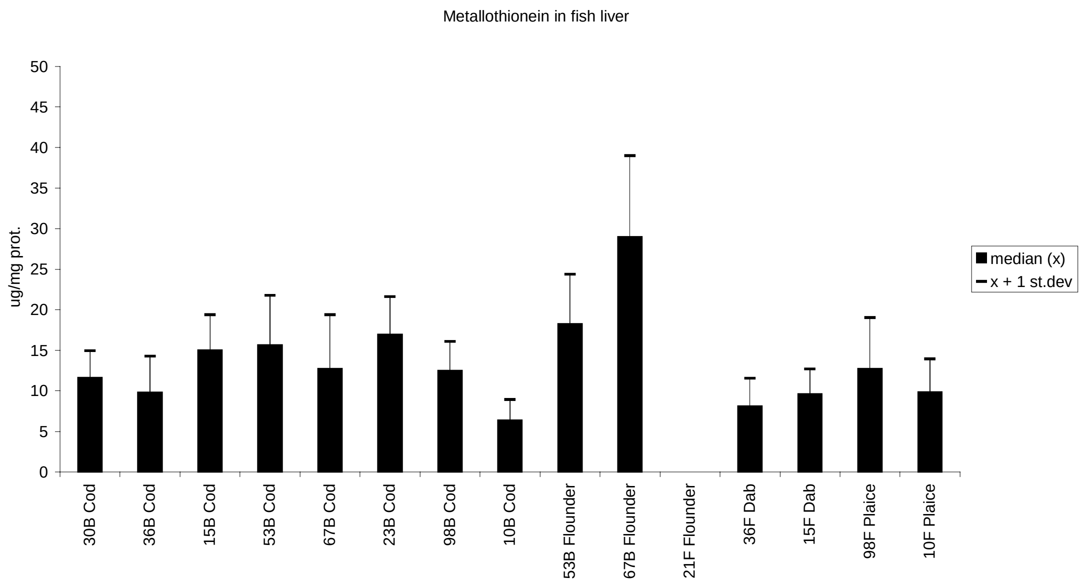


Figure 17. Activity of metallothionein (μg/mg protein) in fish liver from Atlantic cod, flounder, dab and plaice collected at the indicated stations 2001.

1.4.5 Concluding remarks

The application of BEM methods within JAMP through the years 1997-2001 has indicated that the location 15B, previously regarded as only diffusely polluted, has an input of PAH which is sufficient to markedly affect fish in the area. Chronic exposure to PAHs may lead to liver lesions and reproductive disorders in fish, as shown through National Ocean and Atmospheric Administration's (NOAA (USA)) studies in Puget Sound. The highest levels of PAH metabolites observed in the bile of cod from station 15B are high compared to other studies, but it is not at present possible to infer population effects on cod in the area. It would be relevant to include DNA adduct analyses at some stage to clarify whether the cellular repair system of cod is sufficient to protect against damage from PAH radicals.

Results for the period 1997-2001 clearly indicated that there are lead effects, shown by decreased activity of the enzyme ALA-D in the two most strongly polluted areas, i.e. cod from the inner Oslofjord (30B) and cod and flounder from the inner Sørfjord (53B/F).

New EROD-data (2000 and 2001) indicate that Lofoten (98B) is the least contaminated station for cod. EROD analyses also indicated that cod from Varangerfjord (10B) (2000 and 2001), presumed to be only diffusely contaminated, was more influenced by organochlorine contaminants than PAHs.

Hepatic metallothionein generally reflect metal concentrations in the liver of the fish studied. A more detailed statistical analyses will be required to separate the influence of natural physiological processes from exposure to elevated environmental metal concentrations.

1.5 Effects and concentrations of organotin

Effects from organotin in dogwhelks (*Nucella lapillus*) and concentrations in dogwhelks and blue mussels (*Mytilus edulis*) were investigated in respectively eight and ten locations along the coast of Norway 2001.

Dogwhelks were sampled in outer Oslofjord (st. 36G), Langesundsfjord (71G), southern Norway (76G, 131G), south-west Norway (15G), Haugesund (227G), western Norway (22G) and northern Norway (98G) in September-October 2001. Blue mussels were sampled from inner Oslofjord (30A), outer Oslofjord (st. 36A), Langesundsfjord (71A), Risør (76A), southern Norway (I131), Farsund (15A), Haugesund (227A), western Norway (22A), Svolvær, Lofoten (98A) and Varangerfjord (10A) in October-November 2001 (Appendix K and maps in Appendix F). TBT-induced development of male sex-characters in females, known as imposex (VDSI and RPSI), was analysed according to OSPAR-JAMP guidelines. Detailed information about the chemical analyses of the animals is given in Følsvik *et al*. (1999).

1.5.1 Dogwhelks

Evident effects from organotin was in 2001 observed at all stations. (Figure 18). Concentrations of organotin, however, were relatively low at the coastal locations in southern Norway, and at the northern location (≤ 20 µg Sn/kg d.w.). Most heavily affected were snails from the Haugesund location (st. 227G, VDSI=4.3), and the highest organotin levels were also found in this area (55.3 µg Sn/kg d.w., cf. Appendix K).

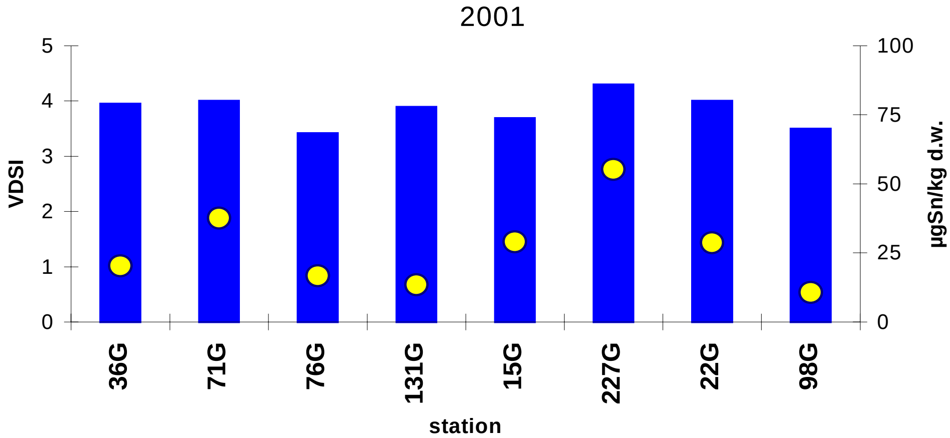


Figure 18. Concentrations of TBT (µg Sn/kg d.w.; circles) and imposex (VDSI; columns) in dogwhelks from 8 stations along the coast of Norway 2001.

There was no clear trend in VDSI from 1991 to 2001 at Færder (36G), while conditions in the Haugesund area (227G) have become slightly worse since 1999 (Figure 19, Appendix K).

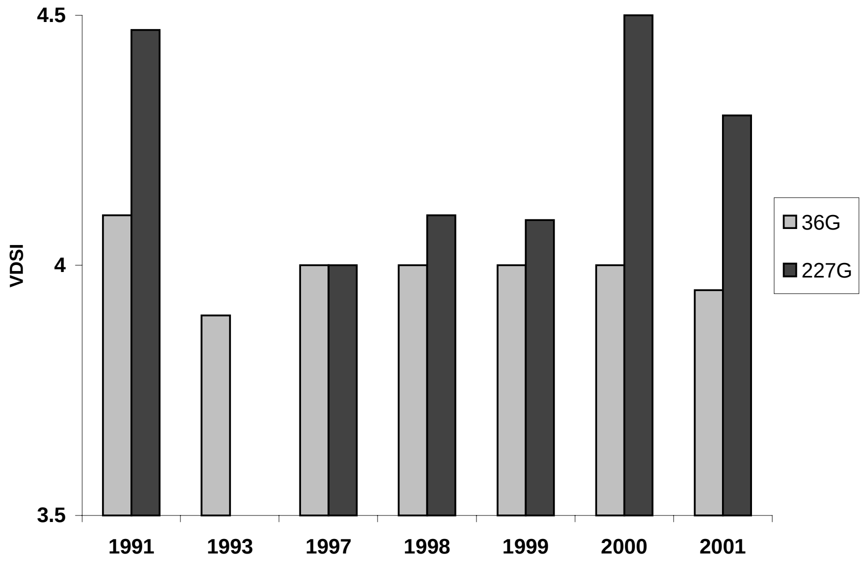


Figure 19. Imposex (VDSI) in dogwhelks (*Nucella lapillus*) at 2 stations in southern Norway; Færder (36G) and Haugesund (227G). Data from 1991 (Harding *et al*. (1992) and 1993 (Walday *et al*. 1997). (cf. Appendix F, Maps 2 and 5).

The development of the 'relative penis size index' (RPSI) is consistent with the VDSI for Færder (36G) over the years, but variation from year to year is somewhat higher (Figure 20). The Færder area is clearly less affected than Haugesund (227G) considering RPSI. Conditions at Haugesund seems to have improved during the two last years, but variance between years is considerable.

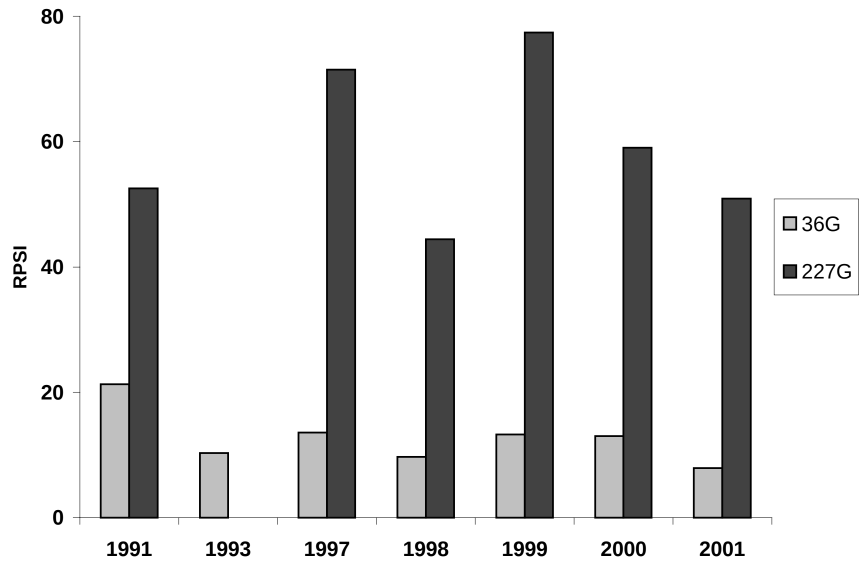


Figure 20. Imposex (RPSI) in dogwhelks (*Nucella lapillus*) at 2 stations in southern Norway; Færder (36G) and Haugesund (227G). Data from 1991 (Harding *et al*. (1992) and 1993 (Walday *et al*. 1997). (cf. Appendix F, Maps 2 and 5).

1.5.2 Mussels

Three replicate samples were analysed for station 30A and 227A. Two replicates were analysed for 36A, 15A, 22A, 98A and 10A while one was analysed for 71A, 76A and I131. Concentrations of organotin in mussels were high, highest in the near harbour stations (30A and 227A), while they were low in the northern station (10A). Levels ranged between 8 and 467 µg Sn/kg d.w. (Table 2, Appendix A). According to the Norwegian classification of environmental quality (Molvær *et al*. 1997) the inner Oslofjord- (30A) and one of the replicates at Haugesund (227A) were markedly polluted from TBT (Figure 21), while the rest of the samples were moderately polluted, except for the northern station (10A) that was moderately polluted. TBT-concentrations in the samples from Færder (36A), Gåsøy (15A) and Lofoten (98A) were just above Class I (insignificantly polluted) (Appendix K). Generally, levels in 2001 were lower compared to previous years.

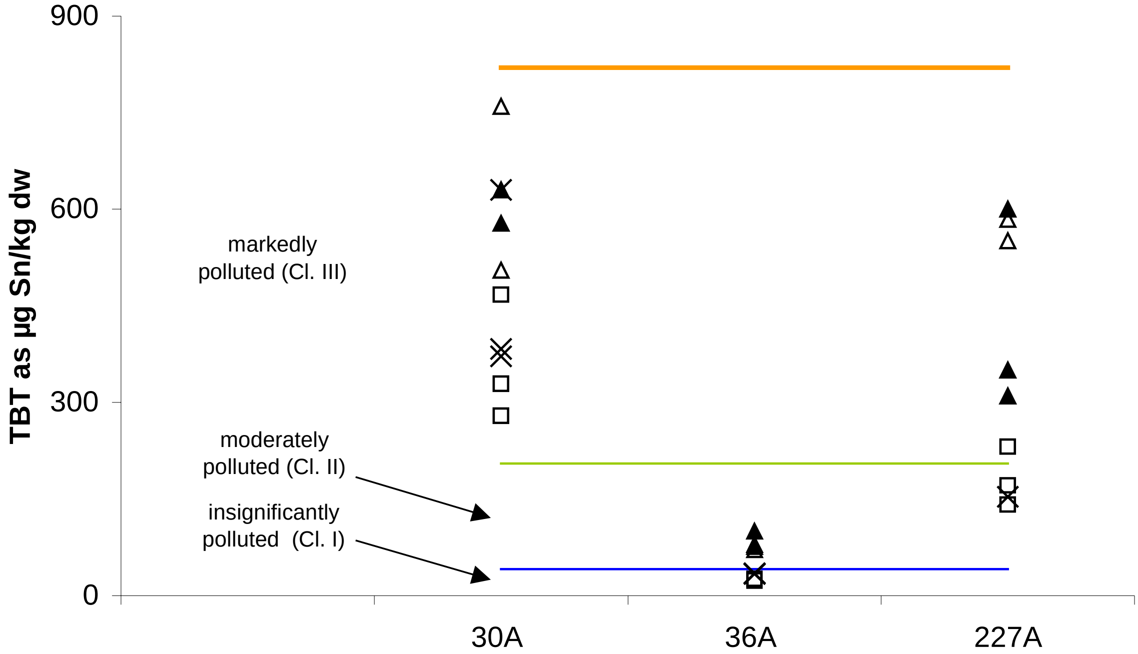


Figure 21. Levels of TBT (µg Sn/kg d.w.) in replicate samples of blue mussels (*Mytilus edulis*) from three stations in Southern Norway in 1998 (Δ), 1999 (▲), 2000 (x) and 2001 (□), (cf. Appendix F, Maps 1, 2, and 5).

1.5.3 Concluding remark

The presence of organotin (as TBT) in Norwegian waters was still a problem in 2001, most evident close to harbours. Concentrations of organotin in mussels and dogwhelks were elevated, and biological effects from TBT were found in dogwhelks from all of the investigated areas. There is no clear improvement through the years according to imposex, but concentrations of TBT in mussels were lower than previous years. It is a cause for concern that the ban on the use of TBT in antifouling on vessels <25 m of length has not lead to a clear improvement in the investigated areas.

1.6 Concentrations in deep-water fish

The concentrations of contaminants in the deep-water fish tusk (*Brosme brosme*), ling (*Molva molva*) and rat fish (*Chimaera monstrosa*) were investigated in Åkrafjord (reference) and Sørfjord April 2000 and December 2001. The deep-water fish were caught at ca. 350 m depth. The results have been discussed previously by Knutzen and Green (2001a) and Ruus *et al.* (2002). The following is a summary of the results supplemented with one-way analysis of variance (ANOVA) on $\log_e$-transformed data for 2001 on wet weight (metals) or fat weight basis (organochlorines) and a comparison with levels in cod (*Gadus morhua*).

The concentrations of mercury in fillet were significantly higher in the deep-water fish compared to cod from Karihavet (st.23B, reference) and Sørfjord (st.53B) 1999-2001. Cod was caught between 20 and 60 m depth. Compared to cod, mercury in deep-water fish was 2-7 times higher in the Sørfjord and 3-4 times higher in reference area (st.23 for cod and st.21 for the deep-water fish) (cf. Appendix L). Applying SFT's classification of environmental quality for cod (cf. Table 6), the median concentration for tusk and ling from the Sørfjord, 2.3 and 1.1 ppm w.w., respectively, would be in Cl.V or extremely polluted and rat fish with 0.8 ppm w.w. would be in Cl.IV or severely polluted. The concentrations of lead and DDE were also higher in the liver of tusk and ling compared to cod.

The concentrations of PCBs and DDE in liver and fillet were significantly higher in tusk and ling compared to cod in the reference area. The same tendency was found in fillet from these fish from Sørfjord in 2001, but not for the respective medians for the period 1999-2001 due to high concentrations found in both liver and fillet of cod in 2000 (2-3 times 1989-2001 average, cf. Appendix H). Lower concentrations of ΣPCB-7 in liver were found in rat fish compared to cod or tusk in both areas, and for ling from the reference area. This tendency was not confirmed in the Sørfjord for 1999-2000, again due to the higher concentrations of PCB observed in cod in 2000 (Table 3).

There was significantly higher concentrations of DDE in deep-water fish from Sørfjord compared to the reference area in 2001 for both liver (except rat fish) and fillet. The median in tusk for 1999 and 2001 was 9 and 8 times higher for liver and fillet, respectively, and corresponded to Cl.V and Cl.III in SFT's classification system for cod (cf. Table 6 and Appendix L). The median in ling for the same period was 2 and 3 times higher, corresponding to Cl.IV and Cl.III. DDE in rat fish fillet was 17 times higher and would correspond to Cl.III.

Deep-water fish in the reference area had higher concentrations of some contaminants compared to cod: mercury in tusk, ling and rat fish, cadmium and HCB in tusk, PCBs and DDE in tusk and ling (both liver and fillet). The median concentrations for mercury in fillet of tusk, ling and rat fish were 3-4 times higher than cod, corresponding to Cl.III in the SFT's classification system for cod (cf. Table 6 and Appendix L). ΣPCB-7 in liver was 3-4 times higher in tusk and ling than cod, corresponding to Cl.IV. DDE in liver 7 and 11 times higher in tusk and ling, respectively, than cod, or Cl.III. These differences may be masked in Sørfjord where there are considerable year to year differences in the levels in cod.

Based partly on these results for cadmium, lead, mercury and PCBs, the Norwegian Food Control Authority (SNT) has issued recommendations to limit the consumption of deep-water fish from the Sørfjord (cf., www.snt.no/nytt/tema/kosthold/-hardanger.htm).

Table 3. ANOVA for comparisons between fish from Sørfjorden (st.53) and Karihav (st.23, cod only) or Åkrafjord (st.21) for metals and PCB congener 153, ΣPCB-7 (sum of PCB 28, 52, 101, 118, 138, 153 and 180), DDE, HCB in cod (C - *Gadus morhua*), tusk (T - *Brosme brosme*), ling (L - *Molva molva*) and rat fish (R - *Chimaera monstrosa*), caught October-December 2001. The shaded fields indicate statistically significant differences where concentrations in species "X" are lower (light shading) or higher (dark shading) than in species "Y". "ns" indicates no significant difference between X and Y, "<" or ">" indicates that X is significantly greater than or less than Y, where </> = p<0.05, <</>> = p<0.01, and <<</>>> = p<0.001. "-" indicates no or insufficient data. The exceptions are noted where the 1999-2000 results did not concur. Concentrations are $\log_e$ transformed, on a wet weight basis for metals and a fat weight basis for PCBs, DDE and HCH. See also simple statistic in Appendix L on concentrations for these samples.

Interpreting the table, examples:

C_{23} vs C_{53} liver Cd : The average concentration of cadmium in cod liver from st.23 is significantly lower (p<0.001) than in cod liver from st.53.

B_{53} vs L_{53} fillet Hg : The average concentration of mercury in tusk fillet from st.53 is significantly higher (p<0.05) than in ling fillet from the same station.

X vs Y		Cd	Cu [4]	Pb	Zn [4]	Hg	CB153	ΣPCB-7	ppDDE	HCB
C_{23} vs C_{53}	liver	<<<	ns	< [1]	ns	-	<<<	<<<	<<<	>>>
	fillet	-	-	-	-	<<<	ns	<	<<	>>
T_{21} vs T_{53}	liver	ns	<	< [1]	<	-	ns	ns	<<	ns
	fillet	-	-	-	-	<<	ns	ns	<	ns
L_{21} vs L_{53}	liver	ns	<	< [1]	<	-	ns	ns	<<	>
	fillet	-	-	-	-	<	ns	ns	<	ns
R_{21} vs R_{53}	liver	ns	<	< [1]	ns	-	ns	ns	ns	ns
	fillet	-	-	-	-	<<	ns	-	<<	ns
C_{23} vs B_{21}	liver	<<	-	-	-	-	<<<	<<<	<<<	<
	fillet	-	-	-	-	<<<	<<	<<	<<<	ns
C_{23} vs L_{21}	liver	ns	-	-	-	-	<<	<<	<<<	ns
	fillet	-	-	-	-	<<<	<	<	<<	ns
C_{23} vs R_{21}	liver	ns	-	-	-	-	ns	>	ns	ns
	fillet	-	-	-	-	<<<	ns	>	ns	>>
B_{21} vs L_{21}	liver	ns	-	-	-	-	ns	ns	ns	ns
	fillet	-	-	-	-	ns	ns	ns	ns	ns
B_{21} vs R_{21}	liver	ns	-	-	-	-	ns	>	ns	ns
	fillet	-	-	-	-	ns	>>	>	>	>>
L_{21} vs R_{21}	liver	ns	-	-	-	-	ns	>	ns	ns
	fillet	-	-	-	-	ns	>>	>	ns	ns
C_{53} vs B_{53}	liver	>>	-	ns	-	-	ns	ns	<	<
	fillet	-	-	-	-	<<	<<< [2]	<<< [2]	<<	ns
C_{53} vs L_{53}	liver	>>>	-	ns	-	-	>	>	ns	ns
	fillet	-	-	-	-	ns	< [2]	< [2]	<<<	<<
C_{53} vs R_{53}	liver	>>	-	ns	-	-	>	>>	ns	ns
	fillet	-	-	-	-	ns	ns	-	<<	ns
B_{53} vs L_{53}	liver	ns	-	>>	-	-	ns	ns	ns	ns
	fillet	-	-	-	-	>	ns	ns	ns	ns
B_{53} vs R_{53}	liver	ns	-	>	-	-	>	>	ns	ns
	fillet	-	-	-	-	ns	>> [3]	-	ns	-
L_{53} vs R_{53}	liver	ns	-	ns	-	-	ns	ns	ns	ns
	fillet	-	-	-	-	ns	ns	-	ns	ns

[1] Concentrations in fish from st.21D and 23D below detection limit.
[2] For the 1999-2000 averages, the concentration in cod 1999 was higher.
[3] The 1999-2000 average concentrations were the same.
[4] The essential metals copper and zinc are regulated and concentrations vary naturally between species, and comparisons are not considered here.

1.7 Overall conclusions

In regards to JMP/JAMP Purpose A (health assessment), attention should be called to the list from Norwegian Food Control Authority (SNT) which names the restrictions and recommendations concerning the sale and consumption in Norway for seafood taken from Norwegian fjord areas (Table 4).

In regards to JMP/JAMP Purpose C (spatial distribution assessment), the concentrations found in 2001 are indicated in the bar graphs shown in Appendix I. Provisional "high background" levels were used to identify elevated concentrations. This assessment revealed no new areas of concern that are not currently under surveillance.

In regards to JMP/JAMP Purpose D (temporal trend assessment) there is evidence that the median concentrations of:

- Mercury in fish fillet from the inner Oslofjord has increased since 1984,
- Mercury in mussel from the outer Sørfjord has increased since 1987,
- Cadmium in mussels from four stations in the Sørfjord/Hardangerfjord has decreased since 1987.

Table 4. Summary of action taken by the Norwegian Food Control Authority (SNT, http://www.snt.no/nytt/tema/kosthold/kyst.html; http://www.lovdata.no/for/sf/hd/td-19961129-1240-0.html) concerning the consumption and sale of fish products along the Norwegian Coast. (Area designations from SFT, pers. comm. 2002) Restrictions on sale vary and may concern the whole or part of fish product.

Area of concern (km^2)	Main parameters of concern	Last year of issue/ evaluation	Main fish/shellfish product of concerned	Recommendations or restrictions of concern:
Mid and Inner Oslofjord (498.9)	PCB	2002	fish liver, eel	Consumption and sale
Tønsberg area (23.7)	PCB	2002	fish liver, eel, mussels	Consumption
Inner Sandefjordfjord (1.5)	PCB	1993	fish liver	Consumption and sale
Grenlandsfjords, Langesundsfjord (90.3)	Chl.org[2)]/ Dioxins	2002	fish, shellfish	Consumption and sale
Kragerø (3.2)	PAH Dioxins	2002	eel, mussels	Consumption
Tvedestrand (2.3)	PCB	2000	fish liver	Consumption and sale
Arendal (8.0)	PCB	2000	fish liver	Consumption and sale
Inner Kristiansandsfjord (33.3)	Chl.org[2)]/ Dioxins/PCB	2000	fish, shellfish	Consumption and sale
Farsund (42.0)	PCB PAH	2000	fish liver, mussels	Consumption and sale
Fedafjord (11.2)	PAH	1995	mussels	Consumption and sale
Flekkefjord (4.2)	PCB	2000	fish liver	Consumption and sale
Stavanger (4.0)	PCB PAH	2001	fish liver, mussels	Consumption
Sandnes (1.7)	PAH	2001	mussels	Consumption
Karmsund-Eidsbotn (24.1)	PCB [1)] , PAH	2001	fish liver, shellfish	Consumption and sale
Saudafjord (24.1)	PAH	1992	fish liver, mussels	Consumption and sale
Sørfjord (62.2)	Cd Pb Hg PCB	2002	fish, shellfish	Consumption and sale
Bergen area (169.9)	PCB	1998	fish, shellfish	Consumption and sale
Årdalsfjord (30.4)	PAH Pb Cd	2002	mussels	Consumption and sale
Sunndalsfjord (100.1)	PAH	2002	fish liver, mussels	Consumption and sale
Hommelvik (2.6)	PAH	1985	mussels	Consumption and sale
Inner Trondheimfjorden (1.2)	PAH PCB	2002	fish liver, mussels	Consumption
Inner Ranfjord (15.1)	PAH Pb Hg	1997	mussels	Consumption and sale
Vefsnfjord (76.4)	PAH	2002	mussels	Consumption and sale
Ramsund (5.4)	PCB	2000	fish, shellfish	Consumption and sale
Harstad (1.1)	PCB heavy metals	2000	fish liver, mussels	Consumption and sale
Tromsø (17.7)	PAH	2000	mussels	Consumption and sale
Hammerfest (2.2)	PAH	2000	mussels	Consumption and sale
Honningsvåg (2.1)	PAH	2000	mussels	Consumption and sale

[1)] Concerns only Eidsbotn
[2)] Organochlorine compounds

Study of the power of temporal trend monitoring was useful in assessing existing sampling strategies, however, modifications might be needed to account for local conditions (see Appendix O in Green *et al.* 2000).

The 2001 investigation also includes results on Norwegian Pollution Control Authority Pollution Indices (Appendix J), and discussion of the results of biological effects methods including imposex and intersex (Chapter 1.4 and Chapter 1.5).

The JAMP issues to which these investigations are relevant are shown in Table 5.

Table 5. JAMP issues relating to the Norwegian JAMP (cf., SIME 2002).

Subject	JAMP issue	Question	Recent Norwegian contribution
Hg, Cd and Pb	JAMP issue 1.2.	What are the concentrations and fluxes in sediments and biota?	1996-1997: Levels in sediment (cf., Green *et al.* 2000) 2001: Levels and trends in biota (annual investigations since 1981, Chapter 1.3) 2001: INDEX for blue mussels from selected stations (annual investigations since 1995, cf. Chapter 1.3.8)
TBT	JAMP issue 1.3.	To what extent do biological effects occur in the vicinity of major shipping routes offshore installations, marinas and shipyards	2001: Levels and trends in mussels and snails (annual investigations since 1997, cf. Chapter 1.5)
PCBs	JAMP issue 1.7.	Do high concentrations pose a risk to the marine ecosystem	[as for JAMP issue 1.2]
PCBs	JAMP issue 1.8.	Do high concentrations of non-ortho and mono-ortho CBs in seafood pose a risk to human health?	1995: INDEX for blue mussels from selected stations (cf. Green 1997) 1996: Levels in cod (cf. Green *et al.* 2000)
PAHs	JAMP issue 1.10.	What are the concentrations in the maritime [1)] area?	1992: Levels in shellfish (Green *et al.* 1995) 1992-1993: Levels in fish and mussels for selected stations (Knutzen & Green 1995) 1996-1997: Levels in sediment (cf., Green *et al.* 2000) 2001: INDEX for blue mussels from selected stations (annual investigations since 1995, Chapter 1.3.8)
PAHs	JAMP issue 1.11.	Do PAHs affect fish and shellfish?	1998: Biological effects methods in cod (cf. Chapter 1.4)
Other synthetic organic compounds	JAMP issue 1.12.	How widespread are synthetic organic compounds within the maritime [1)] area?	2001: Levels and trends in biota (annual investigations since 1983 of selected organochlorines, cf. Chapter 1.3) 1996: Introductory investigation of organochlorines in cod livers (cf. Green *et al.* 2000)
Chlorinated dioxins and dibenzofurans	JAMP issue 1.15. [2)]	What concentrations occur and have the policy goals (for the relevant parts of the maritime [1)] area) been met?	1995: INDEX for blue mussels from selected stations (cf. Green 1997) 1996: Introductory investigation of organochlorines in cod livers (cf. Green *et al.* 2000)
Biological effects of pollutants	JAMP issue 1.17.	Where do pollutants cause deleterious biological effects?	2001: Southern Coast, planar PCBs, metals, PAHs in cod (annual investigations since 1997, cf. Chapter 1.4)
Chemicals used	JAMP issue 5.3.	In which areas do pesticides and antibiotics affect marine biota?	2001: Levels and trends in biota (cf. Chapter 1.3)
Ecosystem health	JAMP issue 6.1.[2)]	How can ecosystem health be assessed in order to determine the extent of human impact?	Results for the other issues are also relevant here

[1]) Not defined in original text
[2]) See SIME 1997

2. Technical Details

2.1 Compliance with guidelines/procedures

2.1.1 JAMP programme

Samples were collected and analysed, where practical, according to OSPAR guidelines (OSPAR 1990, 1997) and screened and submitted to ICES by agreed procedures (ICES 1996). The most important point of concern are those stations where insufficient number of fish were collected (cf. Appendix G).

2.1.2 Overconcentrations and classification of environmental quality

This report focuses on the principle cases where *median* concentrations exceeded the upper limit to Class I in the Norwegian Pollution Control Authority's (SFT's) **environmental quality classification system** (cf. Molvær *et al.* 1997). The relevant extract from the system is shown in Table 6 and show five classes from Cl.I, Insignificantly polluted, to Cl.V, extremely polluted. However, the system does not cover all the contaminants in indicator species-tissues used in JAMP. To assess concentrations not included in the system provisional "high background" values were used (Table 7). The factor by which concentrations exceeded “high background” is termed **overconcentration**. It should be noted that there is in general a need for periodic review and supplement of this list of limits in the light of results from reference localities and introduction of new analytical methods, and/or units. Because of changes in the limits, assessments of overconcentrations for years prior to 1997 made in this report may not correspond to figures and assessments made in previous national comments. The median concentration can be found in the tables in Appendix H or figures in Appendix I.

A review of provisional "high background" concentrations based on recent JAMP-data generally confirmed that the reference concentrations (i.e., upper limit for Class I) in SFT's classification system, but recommended the following revisions (Knutzen & Green 2001b, concentrations in µg/kg wet weight):

- Cod liver - ΣDDT: Either increase limit from 200 to 300 or preferably replace ΣDDT with p,p-DDE and keep the limit at 200
- Cod liver - ΣHCH: Decrease limit from 50 to 30.
- Cod liver - TEPCDD/PCDF: Decrease limit from 0.015 to 0.01
- Cod fillet - ΣPCB7: Decrease limit from 5 to 3
- Cod fillet - ΣHCH: Decrease limit from 0.5 to 0,3
- Blue mussel - ΣPCB7: Decrease limit from 4 to 3

Mostly based on data from other studies the review (Knutzen & Green 2001b) also suggested the following decreases for Class I in fillet of flounder (µg/kg w.w.):

- ΣPCB7: from 5 to 3.
- From 2 for ΣDDT to 1 for p,p-DDE

The review did not recommend changes in the Class I limits for mercury in fish fillet (1 mg/kg w.w.) or mercury, cadmium, lead, zinc and copper in mussels (in the same order 0.2; 2; 3; 200 and 10 mg/kg d.w.). However, for chromium and nickel in mussels limits should be decreased from 3 to 2 and from 5 to 3 mg/kg d.w., respectively. Further, reference values for organochlorines were indicated for fillet and liver of fish species that are not included in the classification system (dab, plaice, lemon sole) and for lead and cadmium in liver of cod.

These recommendations for changes have not been taken into account in this report. SFT is considering these recommendations in a current review their classification system.

No attempt has been made to compensate for differences in size groups or number of individuals of mussels or fish. The exception was with mercury in fish fillet where six data sets in both cod and flatfish in this study showed significant differences between “small” and “large” fish (Appendix H). In regards to mussels, there is some evidence that concentrations do not vary significantly among the three size groups employed for this study (i.e. 2-3, 3-4 and 4-5 cm) (WGSAEM 1993).

With respect to Purpose A (health risk assessment), the Norwegian Food Control Authority (SNT) is responsible for official commentary as to possible health risk due to consumption of seafood. Hence, the results of the JAMP pertaining to this purpose are presented only as a partial basis for evaluation.

Table 6. Extracts of the Norwegian Pollution Control Authority revised environmental classification system of contaminants in blue mussels and fish (from Molvær *et al.* 1997).

Contaminant			**Classification (upper limit for classes I-IV)** *Degree of pollution*				
			I *Insignificant*	**II** *Moderate*	**III** *Marked*	**IV** *Severe*	**V** *Extreme*
BLUE MUSSEL							
Lead	ppm	d.w.	3	15	40	100	>100
Cadmium	ppm	d.w.	2	5	20	40	>40
Copper	ppm	d.w.	10	30	100	200	>200
Mercury	ppm	d.w.	0.2	0.5	1.5	4	>4
Zinc	ppm	d.w.	200	400	1000	2500	>2500
TBT [1)]	ppm	d.w.	0.1	0.5	2	5	>5
∑PCB-7	ppb	w.w.	4	15	40	100	>100
		d.w. [2)]	*20*	*75*	*200*	*500*	*>500*
∑DDT	ppb	w.w.	2	5	10	30	>30
		d.w. [2)]	*10*	*25*	*50*	*150*	*>150*
∑HCH	ppb	w.w.	1	3	10	30	>30
		d.w. [2)]	*5*	*15*	*50*	*150*	*>150*
HCB	ppb	w.w.	0.1	0.3	1	5	>5
HCB in d.w. [2)]		*d.w.* [2)]	*0.5*	*1.5*	*5*	*25*	*>25*
$TE_{PCDF/D}$ [3)]	ppp [4)]	w.w.	0.2	0.5	1.5	3	>3
COD, fillet							
Mercury	ppm	w.w.	0.1	0.3	0.5	1	>1
∑PCB-7	ppb	w.w.	5	20	50	150	>150
∑DDT	ppb	w.w.	1	3	10	25	>25
∑HCH	ppb	w.w.	0.5	2	5	15	>15
HCB	ppb	w.w.	0.2	0.5	2	5	>5
COD, liver							
∑PCB-7	ppb	w.w.	500	1500	4000	10000	>10000
∑DDT	ppb	w.w.	200	500	1500	3000	>3000
∑HCH	ppb	w.w.	50	200	500	1000	>1000
HCB	ppb	w.w.	20	50	200	400	>400
$TE_{PCDF/D}$ [2)]	ppp [4)]	w.w.	15	40	100	300	>300

[1]) Tributyltin on a formula basis
[2]) Conversion assuming 20% dry weight
[3]) TCDDN (Appendix B)
[4]) µg/1000 kg (Appendix B)

Table 7. Provisional "high background levels" of selected contaminants, in **ppm (mg/kg) dry weight** (blue mussel) and **ppm (mg/kg wet weight)** (blue mussel and fish). The respective "high background" limits are from Knutzen & Skei (1990) with mostly minor adjustments (Knutzen & Green 1995; Molvær *et al.* 1997), except for dab where the suggested limit is based on JAMP-data (Knutzen & Green 1995). Especially uncertain values are marked with "?".

Cont.	Blue mussel [1]		Cod [1]		Flounder [1]		Dab [1]		Plaice [1]	
			liver	fillet	liver	fillet	liver	fillet	liver	fillet
	ppm d.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.	ppm w.w.
Lead	3.0 [2)]	0.6 [3)]	0.1		0.3 ?		0.3 ?		0.2 ?	
Cadmium	2.0 [2)]	0.4 [3)]	0.1		0.3 ?		0.3 ?		0.2 ?	
Copper	10 [2)]	2 [3)]	20		10 ?		30 ?		10 ?	
Mercury	0.2 [2)]	0.04 [3)]		0.1 [2)]		0.1 ?		0.1		0.1 ?
Zinc	200 [2)]	40 [3)]	30		50 ?		60 ?		50 ?	
∑PCB-7 [8)]	0.020 [3)]	0.004 [2)]	0.5 [2)]	0.005	0.5 ?	0.010 ?	0.10 ?	0.005 ? [2)]	0.05 ?	0.002 ?
ppDDE	0.010 [3)]	0.002 [6)]	0.2 [2)]		0.1 ? [6)]		0.03 ? [6)]		0.01 ? [6)]	
γ HCH	0.005 [3)]	0.001 [6)]	0.05 [2,6)]		0.03 ? [6)]		0.01 ? [6)]		0.005 ? [6)]	
HCB	0.0005 [3)]	0.0001 [2)]	0.02 [2)]		0.01 ?		0.005 ?		0.005 ?	
TCDDN	0.000001 [3)]	0.0000002 [2)]								

[1]) Respectively: *Mytilus edulis, Gadus morhua, Platichthys flesus* and *Limanda limanda*.
[2]) From the Norwegian Pollution Control Authority Environmental Class I ("good") (Molvær *et al.* 1997).
[3]) Conversion assuming 20% dry weight.
[4]) Approximately 25% of ΣPCB-7 (Knutzen & Green 1995)
[5]) 1.5-2 times 75% quartile (cf. Annex B in Knutzen & Green 1995)
[6]) Assumed equal to limit for ΣDDT or ΣHCH, respectively, from the Norwegian Pollution Control Authority Environmental Class I ("good") (Molvær *et al.* 1997). Hence, limits for ppDDE and γHCH are probably too high (lacking sufficient and reliable reference values)
[7]) Mean plus 2 times standard deviation (cf. Annex B in Knutzen & Green 1995)
[8]) Estimated as sum of 7 individual PCB compounds (CB-28, -52, -101, -118, -138, -153 and -180) and assumed to be ca. 50% and 70 % of total PCB for blue mussel and cod/flatfish, respectively.

2.1.3 Comparison with previous data

A simple 3-model approach has been developed to study time trends for contaminants in biota based on *median* concentrations (ASMO 1994). A variation of this method was applied to mercury in fish fillet to distinguish trends in "large" and "small" individuals. The method was first used on a large-scale basis by the Ad Hoc Working Group on Monitoring that met in Copenhagen 8-12. November 1993 (MON 1993). At this meeting it was agreed to apply the method on contaminants in fish muscle and liver on a wet weight basis and contaminants in soft tissue of mussels on a dry weight basis. The results for this assessment are presented earlier (cf. ASMO 1994). The method has been applied to Norwegian data and results are shown in Appendix G. The results can be presented as in Figure 22.

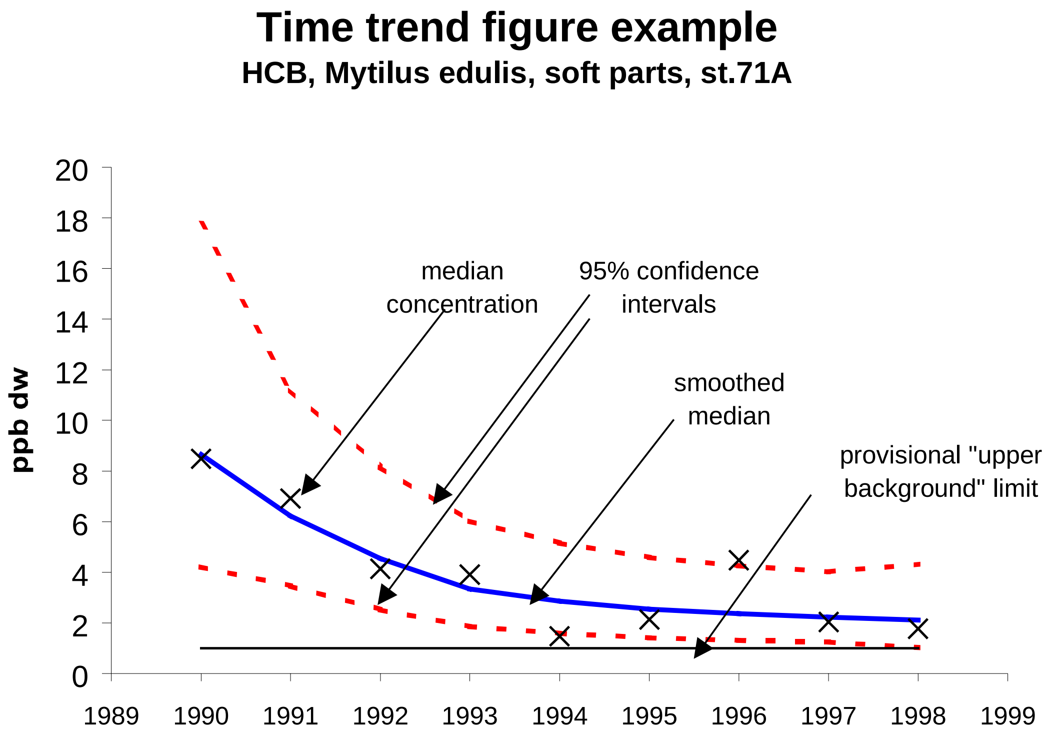


Figure 22. Example presentation and variation in contaminant concentration with time, indicating median concentrations, running mean of median values (Loess smoother), 95% confidence intervals. The provisional "high background level" is marked with a horizontal line and corresponds to values listed in Table 7 (see text).

The method of calculating the smoother is in accordance to the methods employed at Ad Hoc Working Group on Monitoring that met in Copenhagen 23-27. February 1998 (MON 1998). A Loess smoother is based on a running seven-year interval, a non-parametric curve fitted to median log-concentrations (Nicholson *et al.*1997). For statistical tests based on a fitted smoother to be valid the contaminants indices should be independent to a constant level of variance and the residuals for the fitted model should be lognormally distributed (cf. Nicholson *et al.* 1998).

The National Comments since 1994 have included two additional analyses. The first is that the smoothed median for the last three sampling years is linearly projected for the next three years. This deviates from previous reports where the upper 95 confidence interval was used to assess the likelihood of overconcentrations (Nicholson, *et al.* 1994). The projected estimate is based on the results for the temporal trend analyses of at least 6 years of data.

The second is an estimate of the power of the temporal trend series expressed as the number of years to detect a 10% change per year with a 90% power (cf. Nicholson *et al.* 1997). The fewer the years the easier it is to detect a trend. The power is based on the percentage relative standard deviation (RLSD) estimated using the robust method described by ASMO (1994) and Nicholson *et al.* (1998). The estimate was made for series with at least 3 years of data and covers the *entire* period monitored.

This fixed means of treating all the datasets may give misleading results especially where non-linear temporal changes are known to occur, such as for HCB in blue mussels from Langesundsfjord (Figure 4).

The statistical analysis was carried out on temporal trend data series for cadmium, copper, mercury, lead, zinc, the ΣPCB-7 (congeners: 28, 53, 101, 118, 138, 153, 180), ppDDE (ICES code DDEPP), γ-HCH (ICES code HCHG) and HCB. Except for ΣPCB-7 , assessment focused on individual compounds instead of "sum variables".

2.1.4 The effect of depuration and freezing on mussels

Based on samples collected in the Sørfjord and Hardangerfjord, the JAMP-method of pre-treatment of mussels (i.e., depuration and then cleaning) contrasted significantly to the Index-method (freezing then cleaning) (Green *et al.* 2001a). Using the JAMP-method and based on a dryweight basis, cadmium concentrations were significantly higher (24%), whereas significant lower concentrations were found for lead (45%), zinc (14%), PCBs (CB101, -118, -138, -153 27-52%) and DDTs (50-64%). Lower concentrations indicated that these contaminants are associated with the particle load.

The results were not consistent with a previous study from this region that indicated no significant difference between the methods for mercury, cadmium, copper, lead and zinc (Green 1989). A study on mussels from the mouth of the Glomma River in Southern Norway showed the lead and copper were significantly lower in depurated samples (Green *et al.* 1996); however, no differences were found for PCBs or DDTs (on a lipid basis). The PCB concentrations found in the Glomma study were 3-4 times higher than Sørfjord/Hardangerfjord.

Mercury was the only contaminant common to all three studies that had consistent results; that there is no significant difference between the two methods.

The difference in methods has indicated an effect on the concentration of contaminants in mussels. However, with the exception of mercury, the results for Sørfjord/Hardangerfjord 2001 are inconsistent with two other studies in Norway. Revision of JAMP guidelines and assessment of data should take these results into consideration.

2.2 Information on Quality Assurance

NIVA has participated in all the QUASIMEME international intercalibration exercises, including Round 28 (2002). These exercises have included nearly all the contaminants analysed for JAMP. Quality assurance programme for NIVA is similar to the 2000 programme (cf. Green *et al.* 2002e). In addition, NIVA was accredited in 1993 in accordance with the EN45000 standard by the Norwegian Accreditation (reference P009). A summary of the quality assurance programme at NIVA is given in Appendix A. A summary of the intercalibrations exercises that NIVA has participated in is given in Appendix D.

2.3 Description of the Programme

The sampling for 2001 involved sampling of blue mussel at 40 stations and at least one flatfish species or cod was sampled at 16 stations (cf. Appendix E). The Norwegian JAMP has been expanded since 1989 to include monitoring in more diffusely polluted areas. Though new stations are initially intended for annual monitoring (temporal trends), there has not always been sufficient funds to do this for every station. Sample/station reduction measures have been taken to reduce costs. Furthermore, sufficient samples have not always been practical to obtain. When this applies to mussels, a new site in the vicinity is often chosen. As for fish, the quota of 25 individuals (±10%), indicated in Appendix E, as either 25 individuals or 5 bulked samples consisting of 5 fish per bulked sample, was met for all stations in 2001.

Concentrations of metals, organochlorines (including pesticides) and polycyclic aromatic hydrocarbons in mussels and fish were determined at the Norwegian Institute for Water Research (JAMP code NIVA).

An overview of the methods applied up to and including 2001 sample material has been presented by Green *et al*. (2001b). An overview of the samples collected from 1981 to 2001 is given in Appendix E. An overview of analyses applied from 1981 to 2001 for biological material is given in Appendix C. Parameter abbreviations are given in Appendix B.

The data is stored at NIVA in MS ACCESS 1997. The tables are generated using MS ACCESS 97 and MS EXCEL 97.

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Appendix A
Quality assurance programme

Accreditation

The laboratories at NIVA, both the chemical, microbiological and the ecotoxicological laboratories, were accredited in 1993 for quality assurance system by the National Measurement Service - Norwegian Accreditation and based on European Standard EN45000. NIVA has reference number P009.

Summary of quality control results

A summary of the results for the analyses of the SRM for sediment and biota are shown in Table A1 and A2, respectively.

Marine sediment standard reference material (SRM) MESS-2 and 1941 was used as control for determinations of metals and PCBs/PAHs, respectively.

Dogfish muscle (DORM-2) or dogfish liver (DOLT-2) was used as SRM for the control of the determination of metals (see Table A1). Mackerel oil (350) and mussel tissue (2974) was used as SRM for controls of PCBs and PAHs, respectively. In addition to SRM 2974, an internal standard was used for quality control.

The results were generally satisfactory, the mean was within 2 standard deviations of SRM-mean. Based on the results for **biota** SRM, lead, zinc, benzo[*k*]fluorenthrene and benzo[*e*]pyrene may have been overestimated and copper, CB101 and CB153 may have been underestimated. It should be noted that the SRM value for lead is close to the detection limit for this reporting lab.

See also results from intercalibrations exercises listed in Appendix D.

NIVA has also participated in QUASIMEME exercises up to Round 28 (April 2002) which includes: QTM058MS and QTM059MS for metals in sediments, QTM053BT and QTM054BT for metals in biota, QOR068MS and QOR069MS for organochlorines in sediments, QOR070BT and QOR071BT for organochlorines in biota, QPH032MS and QPH033MS for PAH in sediments. Round 26 (July-October 2001) included QPH027BT and QPH028BT for PAHs in biota. The latest round would apply to the 2001 samples analysed in 2001-2002. The results from this round were generally acceptable (z-scores between -2 and 2).

Table 8. Summary of the quality control results for the 2001 biota samples analysed 2001-2002. The Standard Reference Materials (SRM) were DORM-2* (dogfish muscle) for mussels and fish fillet, DOLT-2* (dogfish liver) for fish liver, 350** (mackerel oil) for mussels and fish liver and 2978** (mussel tissue) for mussels. SRM was analysed in series with the JAMP-samples for analyses of metals (mg/kg w.w.), organochlorines or PAH (µg/kg w.w.). Tissue types were: mussel softbody (SB), fish liver (LI) and fish fillet (MU). SRMs were measured several times (N) over a number of weeks (W).

Code	Contaminant	Tissue type	SRM type	SRM value ± confidence interval	N	W	Mean value	Standard deviation
Cd	**cadmium**	SB	DORM	0.043 ± 0.008	5	2	0.045	0.002
		LI	DOLT	20.80 ± 0.5	10	13	20.9	0.5
Cu	**copper**	SB	DORM	2.34 ± 0.16	2	1	1.87	0.014
		LI	DOLT	25.80 ± 1.1	10	13	25.8	1.4
Pb	**lead**	SB	DORM	0.065 ± 0.007	5	2	0.088	0.024
		LI	DOLT	0.22 ± 0.02	10	13	0.22	0.04
Hg	**mercury**	SB	DORM	4.64 ± 0.26	11	18	4.732	0.144
Zn	**zinc**	SB	DORM	25.6 ± 2.3	2	1	25.650	0.636
		LI	DOLT	85.8 ± 2.5	10	13	98.4	2.5
CB-28	**PCB congener CB-28**	(all)	350	22.5 ± 4	12	20	17.5	2.2
CB-52	**PCB congener CB-52**	(all)	350	62. ± 9	12	20	58.1	3.7
CB-101	**PCB congener CB-101**	(all)	350	164 ± 9	12	20	144.0	8.3
CB-118	**PCB congener CB-118**	(all)	350	142 ± 20	12	20	120.8	6.6
CB-153	**PCB congener CB-153**	(all)	350	317 ± 20	12	20	264.3	19.2
CB-180	**PCB congener CB-180**	(all)	350	73. ± 13	12	20	64.8	5.4
BAA	benzo[*a*]anthracene[1)]	SB	2978	25. ± 7	2	5	29.0	1.4
BAP	benzo[*a*]pyrene[1)]	SB	2978	7. ± 3	2	5	8.05	2.19
BBF	benzo[*b*]fluoranthene[1)]	SB	2978	58. ± 15	2	5	53.5	4.9
BEP	**benzo[*e*]pyrene**	SB	2978	89.3 ± 6.2	2	5	98.5	6.4
BGHIP	**benzo[*ghi*]perylene**	SB	2978	19.7 ± 4.4	2	5	27.5	7.8
BKF	**benzo[*k*]fluoranthene**	SB	2978	24.1 ± 3.4	2	5	33	11.3
CHRTR	chrysene+triphenylene[1 2)]	SB	2978	122 ± 13.5	2	5	116.5	16.3
FLU	**fluoranthene**	SB	2978	166 ± 12	2	5	174.5	17.7
ICDP	**indeno[1,2,3-*cd*]pyrene**	SB	2978	12.2 ± 2.9	2	5	11.6	3.4
PER	**perylene**	SB	2978	4.09 ± 0.32	1	1	6.01	
PYR	**pyrene**	SB	2978	256 ± 21	2	5	289.5	38.9

*) National Research Council Canada, Division of Chemistry, Marine Analytical Chemistry Standards
**) BCR, Community Bureau of Reference, Commission of the European Communities
***) National Institute of Standards & Technology (NIST)
1) Not certified (see NIST certificate)
2) Calculated from separate values for chrysene and triphenylene; respectively, (59+63) ± $\sqrt{(10^2 + 9^2)}$

Appendix B
Abbreviations

Abbreviation[1]	English	*Norwegian*
ELEMENTS		
Al	aluminium	*aluminium*
As	arsenic	*arsen*
Cd	cadmium	*kadmium*
Co	cobalt	*kobolt*
Cr	chromium	*krom*
Cu	copper	*kobber*
Fe	iron	*jern*
Hg	mercury	*kvikksølv*
Li	lithium	*litium*
Mn	manganese	*mangan*
Ni	nickel	*nikkel*
Pb	lead	*bly*
Pb210	lead-210	*bly-210*
Se	selenium	*selen*
Ti	titanium	*titan*
Zn	zinc	*sink*
PAHs		
PAH	polycyclic aromatic hydrocarbons	*polysykliske aromatiske hydrokarboner*
ACNE	acenaphthene	*acenaften*
ACNLE	acenaphthylene	*acenaftylen*
ANT	anthracene	*antracen*
BAA [3]	benzo[*a*]anthracene	*benzo[a]antracen*
BAP [3]	benzo[*a*]pyrene	*benzo[a]pyren*
BBF [3]	benzo[*b*]fluoranthene	*benzo[b]fluoranten*
BBJKF [3]	benzo[*b,j,k*]fluoranthene	*benzo[b,j,k]fluoranten*
BBJKF [3]	benzo[b+j,k]fluoranthene	*benzo[b+j,k]fluoranten*
BBKF [3]	benzo[*b+k*]fluoranthene	*benzo[b+k]fluoranten*
BEP	benzo[e]pyrene	*benzo[e]pyren*
BGHIP	benzo[*ghi*]perylene	*benzo[ghi]perylen*
BIPN [2]	biphenyl	*bifenyl*
BJKF [3]	benzo[*j,k*]fluoranthene	*benzo[j,k]fluorantren*
BKF [3]	benzo[*k*]fluoranthene	*benzo[k]fluorantren*
CHR	chrysene	*chrysen*
CHRTR	chrysene+triphenylene	*chrysen+trifenylen*
COR	coronene	*coronen*
DBAHA [3]	dibenz[*a,h*]anthracene	*dibenz[a,h]anthracen*
DBA3A [3]	dibenz[*a,c/a,h*]anthracene	*dibenz[a,c/a,h]antracen*
DBP [3]	dibenzopyrenes	*dibenzopyren*
DBT	dibenzothiophene	*dibenzothiofen*
DBTC1	C_1-dibenzothiophenes	*C_1-dibenzotiofen*
DBTC2	C_2-dibenzothiophenes	*C_2-dibenzotiofen*
DBTC3	C_3-dibenzothiophenes	*C_3-dibenzotiofen*
FLE	fluorene	*fluoren*
FLU	fluoranthene	*fluoranten*

Abbreviation[1]	English	*Norwegian*
PAHs (cont.)		
ICDP [3]	indeno[*1,2,3-cd*]pyrene	*indeno[1,2,3-cd]pyren*
NAP [2]	naphthalene	*naftalen*
NAPC1 [2]	C_1-naphthalenes	*C_1-naftalen*
NAPC2 [2]	C_2-naphthalenes	*C_2-naftalen*
NAPC3 [2]	C_3-naphthalenes	*C_3-naftalen*
NAP1M [2]	1-methylnaphthalene	*1-metylnaftalen*
NAP2M [2]	2-methylnaphthalene	*2-metylnaftalen*
NAPD2 [2]	1,6-dimethylnaphthalene	*1,6-dimetylnaftalen*
NAPD3 [2]	1,5-dimethylnaphthalene	*1,5-dimetylnaftalen*
NAPDI [2]	2,6-dimethylnaphthalene	*2,6-dimetylnaftalen*
NAPT2 [2]	2,3,6-trimethylnaphthalene	*2,3,6-trimetylnaftalen*
NAPT3 [2]	1,2,4-trimethylnaphthalene	*1,2,4-trimetylnaftalen*
NAPT4 [2]	1,2,3-trimethylnaphthalene	*1,2,3-trimetylnaftalen*
NAPTM [2]	2,3,5-trimethylnaphthalene	*2,3,5-trimetylnaftalen*
NPD	Collective term for naphthalenes, phenanthrenes and dibenzothiophenes	*Sammebetegnelse for naftalen, fenantren og dibenzotiofens*
PA	phenanthrene	*fenantren*
PAC1	C_1-phenanthrenes	*C_1-fenantren*
PAC2	C_2-phenanthrenes	*C_2-fenantren*
PAM1	1-methylphenanthrene	*1-metylfenantren*
PAM2	2-methylphenanthrene	*2-metylfenantren*
PADM1	3,6-dimethylphenanthrene	*3,6-dimetylfenantren*
PADM2	9,10-dimethylphenanthrene	*9,10-dimetylfenantren*
PER	perylene	*perylen*
PYR	pyrene	*pyren*
DI-Σn	sum of "n" dicyclic "PAH"s (footnote 2)	*sum "n" disykliske "PAH" (fotnote 2)*
P-Σn	sum "n" PAH	*sum "n" PAH*
PK-Σn	sum carcinogen PAHs (footnote 3)	*sum kreftfremkallende PAH (fotnote 3)*
PAHΣΣ	DI-Σn + P-Σn etc.	*DI-Σn + P-Σn mm..*
SPAH	"total" PAH, specific compounds not quantified (outdated analytical method)	*"total" PAH, spesifikk forbindelser ikke kvantifisert (foreldret metode)*
BAP_P	% BAP of PAHΣΣ	*% BAP av PAHΣΣ*
BAPPP	% BAP of P-Σn	*% BAP av P-Σn*
BPK_P	% BAP of PK-Σn	*% BAP av PK-Σn*
PKn_P	% PK-Σn of PAHΣΣ	*% PK-Σn av PAHΣΣ*
PKnPP	% PK-Σn of P-Σn	*% PK-Σn av P-Σn*

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
PCBs		
PCB	polychlorinated biphenyls	*polyklorerte bifenyler*
CB	individual chlorobiphenyls (CB)	*enkelte klorobifenyl*
CB28	CB28 (IUPAC)	*CB28 (IUPAC)*
CB31	CB31 (IUPAC)	*CB31 (IUPAC)*
CB44	CB44 (IUPAC)	*CB44 (IUPAC)*
CB52	CB52 (IUPAC)	*CB52 (IUPAC)*
CB77 [4]	CB77 (IUPAC)	*CB77 (IUPAC)*
CB81 [4]	CB81 (IUPAC)	*CB81 (IUPAC)*
CB95	CB95 (IUPAC)	*CB95 (IUPAC)*
CB101	CB101 (IUPAC)	*CB101 (IUPAC)*
CB105	CB105 (IUPAC)	*CB105 (IUPAC)*
CB110	CB110 (IUPAC)	*CB110 (IUPAC)*
CB118	CB118 (IUPAC)	*CB118 (IUPAC)*
CB126 [4]	CB126 (IUPAC)	*CB126 (IUPAC)*
CB128	CB128 (IUPAC)	*CB128 (IUPAC)*
CB138	CB138 (IUPAC)	*CB138 (IUPAC)*
CB149	CB149 (IUPAC)	*CB149 (IUPAC)*
CB153	CB153 (IUPAC)	*CB153 (IUPAC)*
CB156	CB156 (IUPAC)	*CB156 (IUPAC)*
CB169 [4]	CB169 (IUPAC)	*CB169 (IUPAC)*
CB170	CB170 (IUPAC)	*CB170 (IUPAC)*
CB180	CB180 (IUPAC)	*CB180 (IUPAC)*
CB194	CB194 (IUPAC)	*CB194 (IUPAC)*
CB209	CB209 (IUPAC)	*CB209 (IUPAC)*
CB-Σ7	CB: 28+52+101+118+138+153+180	*CB: 28+52+101+118+138+153+180*
CB-ΣΣ	sum of CBs, includes CB-Σ7	*sum CBer, inkluderer CB-Σ7*
TECBW	Sum of CB-toxicity equivalents after WHO model, see **TEQ**	*Sum CB- toksitets ekvivalenter etter WHO modell, se* ***TEQ***
TECBS	Sum of CB-toxicity equivalents after SAFE model, see **TEQ**	*Sum CB-toksitets ekvivalenter etter SAFE modell, se* ***TEQ***

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
DIOXINs		
TCDD	2, 3, 7, 8-tetrachloro-dibenzo dioxin	*2, 3, 7, 8-tetrakloro-dibenzo dioksin*
CDDST	Sum of tetrachloro-dibenzo dioxins	*Sum tetrakloro-dibenzo dioksiner*
CDD1N	1, 2, 3, 7, 8-pentachloro-dibenzo dioxin	*1, 2, 3, 7, 8-pentakloro-dibenzo dioksin*
CDDSN	Sum of pentachloro-dibenzo dioxins	*Sum pentakloro-dibenzo dioksiner*
CDD4X	1, 2, 3, 4, 7, 8-hexachloro-dibenzo dioxin	*1, 2, 3, 4, 7, 8-heksakloro-dibenzo dioksin*
CDD6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzo dioxin	*1, 2, 3, 6, 7, 8-heksakloro-dibenzo dioksin*
CDD9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzo dioxin	*1, 2, 3, 7, 8, 9-heksakloro-dibenzo dioksin*
CDDSX	Sum of hexachloro-dibenzo dioxins	*Sum heksakloro-dibenzo dioksiner*
CDD6P	1, 2, 3, 4, 6, 7, 8-heptachloro-dibenzo dioxin	*1, 2, 3, 4, 6, 7, 8-heptakloro-dibenzo dioksin*
CDDSH	Sum of heptachloro-dibenzo dioxins	*Sum heptakloro-dibenzo dioksiner*
CDDO	Octachloro-dibenzo dioxin	*Oktakloro-dibenzo dioksin*
PCDD	Sum of polychlorinated dibenzo-p-dioxins	*Sum polyklorinaterte-dibenzo-p-dioksiner*
CDF2T	2, 3, 7, 8-tetrachloro-dibenzofuran	*2, 3, 7, 8-tetrakloro-dibenzofuran*
CDFST	Sum of tetrachloro-dibenzofurans	*Sum tetrakloro-dibenzofuraner*
CDFDN	1, 2, 3, 7, 8/1, 2, 3, 4, 8-pentachloro-dibenzofuran	*1, 2, 3, 7, 8/1, 2, 3, 4, 8-pentakloro-dibenzofuran*
CDF2N	2, 3, 4, 7, 8-pentachloro-dibenzofurans	*2, 3, 4, 7, 8-pentakloro-dibenzofuran*
CDFSN	Sum of pentachloro-dibenzofurans	*Sum pentakloro-dibenzofuraner*
CDFDX	1, 2, 3, 4, 7, 8/1, 2, 3, 4, 7, 9-hexachloro-dibenzofuran	*1, 2, 3, 4, 7, 8/1, 2, 3, 4, 7, 9-heksakloro-dibenzofuran*
CDF6X	1, 2, 3, 6, 7, 8-hexachloro-dibenzofuran	*1, 2, 3, 6, 7, 8-heksakloro-dibenzofuran*
CDF9X	1, 2, 3, 7, 8, 9-hexachloro-dibenzofuran	*1, 2, 3, 7, 8, 9-heksakloro-dibenzofuran*
CDF4X	2, 3, 4, 6, 7, 8-hexachloro-dibenzofuran	*2, 3, 4, 6, 7, 8-heksakloro-dibenzofuran*
CDFSX	Sum of hexachloro-dibenzofurans	*Sum heksakloro-dibenzofuraner*
CDF6P	1, 2, 3, 4, 6, 7, 8-heptachloro-dibenzofuran	*1, 2, 3, 4, 6, 7, 8-heptakloro-dibenzofuran*
CDF9P	1, 2, 3, 4, 7, 8, 9-heptachloro-dibenzofuran	*1, 2, 3, 4, 7, 8, 9-heptakloro-dibenzofuran*
CDFSP	Sum of heptachloro-dibenzofurans	*Sum heptakloro-dibenzofuraner*
CDFO	Octachloro-dibenzofurans	*Octakloro-dibenzofuran*
PCDF	Sum of polychlorinated dibenzo-furans	*Sum polyklorinated dibenzo-furaner*
CDDFS	Sum of PCDD and PCDF	*Sum PCDD og PCDF*
TCDDN	Sum of TCDD-toxicity equivalents after Nordic model, see **TEQ**	*Sum TCDD- toksitets ekvivalenter etter Nordisk modell, se **TEQ***
TCDDI	Sum of TCDD-toxicity equivalents after international model, see **TEQ**	*Sum TCDD-toksitets ekvivalenter etter internasjonale modell, se **TEQ***

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
PESTICIDES		
ALD	aldrin	*aldrin*
DIELD	dieldrin	*dieldrin*
ENDA	endrin	*endrin*
CCDAN	cis-chlordane (=α-chlordane)	*cis-klordan (=α-klordan)*
TCDAN	trans-chlordane (=γ-chlordane)	*trans-klordan (=γ-klordan)*
OCDAN	oxy-chlordane	*oksy-klordan*
TNONC	trans-nonachlor	*trans-nonaklor*
TCDAN	trans-chlordane	*trans-klordan*
OCS	octachlorostyrene	*oktaklorstyren*
QCB	pentachlorobenzene	*pentaklorbenzen*
DDD	dichlorodiphenyldichloroethane 1,1-dichloro-2,2-bis- (4-chlorophenyl)ethane	*diklordifenyldikloretan* *1,1-dikloro-2,2-bis-(4-klorofenyl)etan*
DDE	dichlorodiphenyldichloroethylene (principle metabolite of DDT) 1,1-dichloro-2,2-bis- (4-chlorophenyl)ethylene*	*diklordifenyldikloretylen* *(hovedmetabolitt av DDT)* *1,1-dikloro-2,2-bis-* *(4-klorofenyl)etylen*
DDT	dichlorodiphenyltrichloroethane 1,1,1-trichloro-2,2-bis- (4-chlorophenyl)ethane	*diklordifenyltrikloretan* *1,1,1-trikloro-2,2-bis-(4-klorofenyl)etan*
DDEOP	o,p'-DDE	*o,p'-DDE*
DDEPP	p,p'-DDE	*p,p'-DDE*
DDTOP	o,p'-DDT	*o,p'-DDT*
DDTPP	p,p'-DDT	*p,p'-DDT*
TDEPP	p,p'-DDD	*p,p'-DDD*
DDTEP	p,p'-DDE + p,p'-DDT	*p,p'-DDE + p,p'-DDT*
DD-nΣ	sum of DDT and metabolites, n = number of compounds	*sum DDT og metabolitter,* *n = antall forbindelser*
HCB	hexachlorobenzene	*heksaklorbenzen*
HCHG	Lindane γ HCH = gamma hexachlorocyclohexane (γ BHC = gamma benzenehexachloride, outdated synonym)	*Lindan* *γ HCH = gamma heksaklorsykloheksan* *(γ BHC = gamma benzenheksaklorid,* *foreldret betegnelse)*
HCHA	α HCH = alpha HCH	*α HCH = alpha HCH*
HCHB	β HCH = beta HCH	*β HCH = beta HCH*
HC-nΣ	sum of HCHs, n = count	*sum av HCHs, n = antall*
EOCl	extractable organically bound chlorine	*ekstraherbart organisk bundet klor*
EPOCl	extractable persistent organically bound chlorine	*ekstraherbart persistent organisk bundet klor*
NTOT	total organic nitrogen	*total organisk nitrogen*
CTOT	total organic carbon	*total organisk karbon*
CORG	organic carbon	*organisk karbon*
GSAMT	grain size	*kornfordeling*
MOCON	moisture content	*vanninnhold*

Abbreviations (cont'd.)

Abbreviation[1]	English	*Norwegian*
INSTITUTES		
IFEN	Institute for Energy Technology	*Institutt for energiteknikk*
FIER	Institute for Nutrition, Fisheries Directorate	*Fiskeridirektoratets Ernæringsinstitutt*
FORC	FORCE Institutes, Div. for Isotope Technique and Analysis [DK]	*FORCE Institutterne, Div. for Isotopteknik og Analyse [DK]*
IMRN	Institute of Marine Research (IMR)	*Havforskningsinstituttet*
NACE	Nordic Analytical Center	*Nordisk Analyse Center*
NILU	Norwegian Institute for Air Research	*Norsk institutt forluftforskning*
NIVA	Norwegian Institute for Water Research	*Norsk institutt for vannforskning*
SERI	Swedish Environmental Research Institute	*Institutionen för vatten- och luftvårdsforskning*
VETN	Norwegian Veterinary Institute	*Veterinærinstituttet*
SIIF	Fondation for Scientific and Industrial Research at the Norwegian Institute of Technology - SINTEF (a division, previously: Center for Industrial Research SI)	*Stiftelsen for industriell og teknisk forskning ved Norges tekniske høgskole- SINTEF (en avdeling, tidligere: Senter for industriforskning SI)*

1) After: ICES Environmental Data Reporting Formats. International Council for the Exploration of the Sea. July 1996 and supplementary codes related to non-ortho and mono-ortho PCBs and “dioxins” (ICES pers. comm.)

2) Indicates "PAH" compounds that are dicyclic and not truly PAHs typically identified during the analyses of PAH, include naphthalenes and "biphenyls".

3) Indicates PAH compounds potentially cancerogenic for humans according to IARC (1987), i.e., categories 2A+2B (possibly and probably carcinogenic).

4) Indicates non ortho- co-planer PCB compounds i.e., those that lack Cl in positions 1, 1', 5, and 5'

*) The Pesticide Index, second edition. The Royal Society of Chemistry, 1991.

Other abbreviations *andre forkortelser*

	English	*Norwegian*
TEQ	"Toxicity equivalency factors" for the most toxic compounds within the following groups: • polychlorinated dibenzo-p-dioxins and dibenzofurans (**PCDD/PCDFs**). Equivalents calculated after Nordic model (Ahlborg 1989) [1] or international model (Int./EPA, cf. Van den Berg *et al.*, 1998) [2] • non-ortho and mono-ortho substituted chlorobiphenyls after WHO model (Ahlborg *et al.*, 1994) [3] or Safe (1994, cf. NILU pers. comm.)	*"Toxisitetsekvivalentfaktorer" for de giftigste forbindelsene innen følgende grupper.* • *polyklorerte dibenzo-p-dioksiner og dibenzofuraner (**PCDD/PCDF**). Ekvivalentberegning etter nordisk modell (Ahlborg 1989) [1] eller etter internasjonal modell (Int./EPA, cf. Van den Berg et al. 1998) [2]* • *non-orto og mono-orto substituerte klorobifenyler etter WHO modell (Ahlborg et al., 1994) [3] eller Safe (1994, cf. NILU pers. medd.)*
ppm	parts per million, mg/kg	*deler pr. milliondeler, mg/kg*
ppb	parts per billion, µg/kg	*deler pr. milliarddeler, µg/kg*
ppp	parts per trillion, ng/kg	*deler pr. tusen-milliarddeler, ng/kg*
d.w.	dry weight basis	*tørrvekt basis*
w.w.	wet weight or fresh weight basis	*våtvekt eller friskvekt basis*

[1]) Ahlborg, U.G., 1989. Nordic risk assessment of PCDDs and PCDFs. Chemosphere 19:603-608.

[2]) Van den Berg, Birnbaum, L, Bosveld, A. T. C. and co-workers, 1998. Toxic equivalency factors (TEFs) for PCBs, PCDDs, PCDFs for humans and wildlife. Environ Hlth. Perspect. 106:775-792.

[3]) Ahlborg, U.G., Becking G.B., Birnbaum, L.S., Brouwer, A, Derks, H.J.G.M., Feely, M., Golor, G., Hanberg, A., Larsen, J.C., J.C., Liem, A.K.G., Safe, S.H., Schlatter, C., Wärn, F., Younes, M., Yrjänheikki, E., 1994. Toxic equivalency factors for dioxin-like PCBs. Report on a WHO-ECEH and IPSC consultation , December 1993. Chemosphere 28:1049-1067.

Appendix C
Analytical overview

Sorted by:
- Contaminant, year, laboratory, intercalibration

Abbreviations are defined in Appendix B and Appendix D

Contamin.	**Contaminant defined in Appendix B**
Mon. Year	**Monitoring year**
Lab.	**Analytical laboratory (cf. Appendix B)**
Intercalibr. +basis	**Intercalibration exercise (cf. Appendix D) and basis where W = wet weight and D = dry weight .**
Detect limit	**"Normal" detection limit**
Count below d.lim	**Number of analyses below normal detection limit**
N (<) above d.lim	**Number of analyses where detection limit was higher than normal.**

Tissue					Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year	Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
ACNE	1992-NIVA			W	309	0.2	8			309	0.2	46		
	1995-NIVA			W						309	0.2	72		20
	1996-NIVA			W						309	0.2	65		19
	1997-NIVA			W						309	0.5	34		
	1998-NIVA		CI	W						309	0.5	39		
	1999-NIVA			W						309	0.5	34		
	2000-NIVA			W						309	0.5	38		
	2001-NIVA			W						309	0.5	42		
ACNLE	1992-NIVA			W	309	0.2	8			309	0.2	46		
	1995-NIVA			W						309	0.2	72		49
	1996-NIVA			W						309	0.2	65		42
	1997-NIVA			W						309	0.5	34		
	1998-NIVA			W						309	0.5	39		
	1999-NIVA			W						309	0.5	34		
	2000-NIVA			W						309	0.5	39		
	2001-NIVA			W						309	0.5	41		
AG	1996-NIVA			W						999	miss	3		
ANT	1992-NIVA			W	309	0.2	8			309	0.2	45		
	1995-NIVA			W						309	0.2	72		28
	1996-NIVA			W						309	0.2	65		30
	1997-NIVA			W						309	0.5	35		
	1998-NIVA		CI	W						309	0.5	39		
	1999-NIVA		EK	W						309	0.5	34		
	2000-NIVA			W						309	0.5	39		
	2001-NIVA			W						309	0.5	42		
AS	1996-NIVA			W						999	miss	3		
BAP	1992-NIVA			W	309	0.2	8			309	0.2	45		
	1995-NIVA			W						309	0.2	72		21
	1996-NIVA			W						309	0.2	65		26
	1997-NIVA		AL	W						309	0.5	36		
	1998-NIVA		CI	W						309	0.5	39		
	1999-NIVA		EK	W						309	0.5	34		
	2000-NIVA			W						309	0.5	39		
	2001-NIVA			W						309	0.5	42		
BBF	1992-NIVA			W	309	0.2	8			309	0.2	45		
	1995-NIVA			W						309	0.2	59		9
	1996-NIVA			W						309	0.2	57		6
BBJKF	1995-NIVA			W						309	0.2	12		
	1996-NIVA			W						309	0.2	8		
	1997-NIVA			W						309	0.2	36		1
	1998-NIVA			W						309	0.2	39		
	1999-NIVA			W						309	0.2	34		
	2000-NIVA			W						309	0.2	39		10
	2001-NIVA			W						309	0.2	42		
BEP	1992-NIVA			W	309	0.2	8			309	0.2	45		
	1995-NIVA			W						309	0.2	72		5
	1996-NIVA			W						309	0.2	65		6
	1997-NIVA			W						309	0.2	36		
	1998-NIVA		CI	W						309	0.2	38		
	1999-NIVA		EK	W						309	0.2	34		
	2000-NIVA			W						309	0.2	39		10
	2001-NIVA			W						309	0.2	42		
BGHIP	1992-NIVA			W	309	0.2	8			309	0.2	46		
	1995-NIVA			W						309	0.2	72		20
	1996-NIVA			W						309	0.2	65		10
	1997-NIVA			W						309	0.5	36		
	1998-NIVA		CI	W						309	0.5	35		
	1999-NIVA		EK	W						309	0.5	34		
	2000-NIVA			W						309	0.5	39		
	2001-NIVA			W						309	0.5	42		
BIPN	1992-NIVA			W	309	0.2	8			309	0.2	46		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1995-NIVA		W						309	0.2	72		52
	1996-NIVA		W						309	0.2	62		39
	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39	1	
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	38		1
	2001-NIVA		W						309	0.5	41		
BJKF	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	24		21
	1996-NIVA		W						309	0.2	57		16
BAA	1992-NIVA		W	309	0.2	8			309	0.2	44		
	1995-NIVA		W						309	0.2	72		9
	1996-NIVA		W						309	0.2	65		8
	1997-NIVA		W						309	0.5	36		
	1998-NIVA	CI	W						309	0.5	39		
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
CB101	1987-SIIF		W						111	0.2	21	1	
	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169	1		341	0.05	58		
	1990-SIIF	2G	W						111	0.4	41	6	
	1991-NIVA	2H	W	340	1	179		8	341	0.05	62		
	1991-SIIF	2H	W						111	0.2	35		1
	1992-NIVA	2J	W	340	5	192	3		341	0.1	140		
	1993-NIVA	2K	W	340	4	212	12		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	3		341	0.05	165	39	
	1995-NIVA		W	340	3	318	10		341	0.05	225	10	
	1996-NIVA		W	340	3	332	14		341	0.05	237	9	
	1997-NIVA		W	340	3	260	24						
	1997-NIVA	AJ	W						341	0.05	221	4	
	1998-NIVA		W	340	3	284	19	1					
	1998-NIVA	CH	W						341	0.05	197	1	3
	1999-NIVA		W	340	3	249	6						
	1999-NIVA	EG	W						341	0.05	226		13
	2000-NIVA		W	340	3	230	24						
	2000-NIVA	GU	W						341	0.05	180	11	7
	2001-NIVA		W	340	3	250	19	4					
	2001-NIVA	IO	W						341	0.05	205		16
CB105	1991-NIVA	2H	W	340	1	87		1	341	0.05	47		
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA	QM	W	340	4	212	21		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	8		341	0.05	165	53	
	1995-NIVA		W	340	3	318	13		341	0.05	224	34	
	1996-NIVA		W	340	3	332	22		341	0.05	231	23	
	1997-NIVA		W	340	3	260	24		341	0.05	221	3	1
	1998-NIVA		W	340	3	284	31	19					
	1998-NIVA	CH	W						341	0.05	201	11	16
	1999-NIVA		W	340	3	249	17						
	1999-NIVA	EG	W						341	0.05	226	4	61
	2000-NIVA		W	340	3	230	32						
	2000-NIVA	GU	W						341	0.05	180	21	37
	2001-NIVA		W	340	3	250	29	2					
	2001-NIVA	IO	W						341	0.05	205		76
CB118	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.2	41	1	

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Lab. Year	Inter- calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.2	35		1
	1992-NIVA	2J	W	340	5	192	2		341	0.1	140		
	1993-NIVA	2K	W	340	4	212	10		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	2		341	0.05	165	25	
	1995-NIVA		W	340	3	318	2		341	0.05	225	2	
	1996-NIVA		W	340	3	332	6		341	0.05	237	4	
	1997-NIVA		W	340	3	260	5						
	1997-NIVA	AJ	W						341	0.05	221		
	1998-NIVA		W	340	3	284	6	1					
	1998-NIVA	CH	W						341	0.05	203	3	1
	1999-NIVA		W	340	3	249	2						
	1999-NIVA	EG	W						341	0.05	226		7
	2000-NIVA		W	340	3	230	5						
	2000-NIVA	GU	W						341	0.05	180	6	7
	2001-NIVA		W	340	3	250	1	1					
	2001-NIVA	IO	W						341	0.05	205		21
CB126	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.0001	18		
CB138	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	21		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.3	41		
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.3	35		1
	1992-NIVA	2J	W	340	5	192			341	0.1	137		
	1993-NIVA	QM	W	340	4	212	3		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300			341	0.05	165	12	
	1995-NIVA		W	340	3	318	2		341	0.05	225		
	1996-NIVA		W	340	3	331	1		341	0.05	235		
	1997-NIVA		W	340	3	260	1						
	1997-NIVA	AJ	W						341	0.05	221		1
	1998-NIVA		W	340	3	284	3						
	1998-NIVA	CH	W						341	0.05	203		
	1999-NIVA		W	340	3	249							
	1999-NIVA	EG	W						341	0.05	226		1
	2000-NIVA		W	340	3	230	3						
	2000-NIVA	GU	W						341	0.05	180	3	
	2001-NIVA		W	340	3	250	1	1					
	2001-NIVA	IO	W						341	0.05	205		7
CB153	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.3	41		
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.5	35		1
	1992-NIVA	2J	W	340	5	192			341	0.1	140		
	1993-NIVA	2K	W	340	4	212	3		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300			341	0.05	165	9	
	1995-NIVA		W	340	3	318	1		341	0.05	225		
	1996-NIVA		W	340	3	332	1		341	0.05	237		
	1997-NIVA		W	340	3	260							
	1997-NIVA	AJ	W						341	0.05	221		
	1998-NIVA		W	340	3	284	1						
	1998-NIVA	CH	W						341	0.05	203	1	1
	1999-NIVA		W	340	3	249							
	1999-NIVA	EG	W						341	0.05	226		1
	2000-NIVA		W	340	3	230	3						

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	2000-NIVA	GU	W						341	0.05	180	1	
	2001-NIVA		W	340	3	250		1					
	2001-NIVA	IO	W						341	0.05	205		5
CB156	1991-NIVA	2H	W	340	1	87		15	341	0.05	47		5
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA	QM	W	340	4	212	31		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	24	1	341	0.05	162	70	
	1995-NIVA		W	340	3	317	27		341	0.05	225	67	
	1996-NIVA		W	340	3	332	48		341	0.05	237	62	
	1997-NIVA		W	340	3	260	46						
	1997-NIVA	AJ	W						341	0.05	221	9	10
	1998-NIVA		W	340	3	284	52	70					
	1998-NIVA	CH	W						341	0.05	203	37	47
	1999-NIVA		W	340	3	249	39	2					
	1999-NIVA	EG	W						341	0.05	225	12	134
	2000-NIVA		W	340	3	230	71	5					
	2000-NIVA	GU	W						341	0.05	180	28	90
	2001-NIVA		W	340	3	250	82	3					
	2001-NIVA	IO	W						341	0.05	205	9	134
CB169	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.0001	18	2	
CB180	1987-SIIF		W						111	0.2	21	6	
	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93	1						
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169			341	0.05	58		
	1990-SIIF	2G	W						111	0.2	41	8	
	1991-NIVA	2H	W	340	1	179			341	0.05	62		
	1991-SIIF	2H	W						111	0.2	35		
	1992-NIVA	2J	W	340	5	192	3		341	0.1	140		
	1993-NIVA	2K	W	340	4	212	15		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	3		341	0.05	162	49	
	1995-NIVA		W	340	3	318	5		341	0.05	225	22	
	1996-NIVA		W	340	3	332	14		341	0.05	237	25	
	1997-NIVA		W	340	3	260	18						
	1997-NIVA	AJ	W						341	0.05	221	1	1
	1998-NIVA		W	340	3	284	20	14					
	1998-NIVA	CH	W						341	0.05	203	18	44
	1999-NIVA		W	340	3	249	7	1					
	1999-NIVA	EG	W						341	0.05	226	2	77
	2000-NIVA		W	340	3	230	15						
	2000-NIVA	GU	W						341	0.05	180	15	80
	2001-NIVA		W	340	3	250	17	1					
	2001-NIVA	IO	W						341	0.05	205		99
CB209	1990-NIVA		W	340	2	169	24	11	341	0.05	58		
	1991-NIVA		W	340	2	179	11	88	341	0.05	62	5	7
	1992-NIVA		W	340	5	192	3		341	0.1	140		1
	1993-NIVA		W	340	4	212	46	14	341	0.1	133		
	1994-NIVA		W	340	3	300	29	24	341	0.05	165	91	
	1995-NIVA		W	340	3	318	36		341	0.05	225	92	5
	1996-NIVA		W	340	3	332	255		341	0.05	237	107	9
	1997-NIVA		W	340	3	260	196		341	0.05	221	30	14
	1998-NIVA		W	340	3	283	120	121	341	0.05	203	50	69
	1999-NIVA		W	340	3	243	163	17	341	0.05	224	19	172
	2000-NIVA		W	340	3	228	151	18	341	0.05	172	33	105
	2001-NIVA		W	340	3	250	184	10	341	0.05	205	21	179
CB28	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		1

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1990-NIVA	2G	W	340	1	169	2	2	341	0.05	58		
	1990-SIIF	2G	W						111	0.2	41	7	
	1991-NIVA	2H	W	340	1	179	2	52	341	0.05	62	5	1
	1991-SIIF	2H	W						111	0.3	35		
	1992-NIVA	2J	W	340	5	192	3		341	0.1	137		
	1993-NIVA	2K	W	340	4	212	44	5	341	0.1	133		
	1994-NIVA	2Z	W	340	3	282	18	4	341	0.05	163	73	
	1995-NIVA		W	340	3	313	27		341	0.05	225	75	
	1996-NIVA		W	340	3	332	107		341	0.05	236	70	
	1997-NIVA		W	340	3	260	81						
	1997-NIVA	AJ	W						341	0.05	221	22	14
	1998-NIVA		W	340	3	284	96	99					
	1998-NIVA	CH	W						341	0.05	201	33	46
	1999-NIVA		W	340	3	249	96	18					
	1999-NIVA	EG	W						341	0.05	226	14	143
	2000-NIVA		W	340	3	230	110	7					
	2000-NIVA	GU	W						341	0.05	180	26	60
	2001-NIVA		W	340	3	250	146	10					
	2001-NIVA	IO	W						341	0.05	205	17	145
CB52	1987-SIIF		W						111	0.2	20	1	
	1988-SIIF		D						111	0.1	6		
	1988-SIIF		W						111	0.1	22		
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	0.1	36		
	1990-NIVA	2G	W	340	1	169	2	6	341	0.05	58		
	1990-SIIF	2G	W						111	0.4	41	7	
	1991-NIVA	2H	W	340	1	179	1	37	341	0.05	62	5	1
	1991-SIIF	2H	W						111	0.3	35		
	1992-NIVA	2J	W	340	5	192	3		341	0.1	137		
	1993-NIVA	2K	W	340	4	212	40		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	9		341	0.05	165	64	
	1995-NIVA		W	340	3	312	19		341	0.05	214	28	
	1996-NIVA		W	340	3	332	49		341	0.05	235	31	
	1997-NIVA		W	340	3	260	116						
	1997-NIVA	AJ	W						341	0.05	221	25	10
	1998-NIVA		W	340	3	281	47	44	341	0.05	168	12	17
	1999-NIVA		W	340	3	249	52	11					
	1999-NIVA	EG	W						341	0.05	216	7	71
	2000-NIVA		W	340	3	230	65	4					
	2000-NIVA	GU	W						341	0.05	177	22	20
	2001-NIVA		W	340	3	250	66	4					
	2001-NIVA	IO	W						341	0.05	180	7	58
CB77	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.0001	18		
CB81	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.0001	18		
CD	1981-SIIF	1E	W	130	10	28			130	5	27		
	1981-SIIF	1F	W						130	10	7		
	1982-SIIF	1F	W						130	10	18		
	1982-VETN		W	230	10	54							
	1983-SIIF	1F	W						130	10	17		
	1983-VETN	1Z	W	230	10	46							
	1984-FIER	1H	W	402	1	23							
	1984-SIIF	1G	W						130	10	27		
	1984-VETN	1Z	W	230	10	66							
	1985-SIIF	1G	D						130	10	35		
	1985-VETN	1Z	W	230	10	45		3					
	1986-NIVA	1H	D	312	30	56	1		312	30	20		
	1987-FIER	1G	W	402	1	37							
	1987-NIVA	1H	D	312	30	57		4	312	30	37		
	1988-NIVA	1H	D	312	30	61	11	1	312	30	55		
	1989-NIVA	1H	D	312	30	135	11	8					

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1989-NIVA	1H	W						312	30	36		
	1990-NIVA	1H	W	312	10	189	9	2	312	30	77	5	
	1991-NIVA	1H	W	312	10	190	29	2	312	10	67		
	1992-NIVA	1H	W	312	10	191	4		312	10	111		
	1993-NIVA	1H	W	312	50	221	98		312	50	79		
	1994-NIVA	1Z	W	312	50	302	134		312	50	81		
	1995-NIVA		W	312	50	318	129		312	50	139	2	
	1996-NIVA	V1	W						312	50	125		
	1996-NIVA	V2	W	312	50	368	128						
	1997-NIVA		W	312	50	287	90						
	1997-NIVA	AH	W						312	50	107		
	1998-NIVA		W	312	50	285	101		312	50	93		
	1999-NIVA		W	312	50	235	79						
	1999-NIVA	EF	W						312	50	132	15	
	2000-NIVA		W	312	50	227	82						
	2000-NIVA	GS	W						312	50	90		
	2001-NIVA		W	312	50	261	103						
	2001-NIVA	IM	W						312	50	93		
CDD1N	1995-NILU		W						841	0.00002	6	1	1
	1996-NILU		W						841	0.00001	18		2
CDD4X	1995-NILU		W						841	0.00002	6	3	1
	1996-NILU		W						841	0.00002	18		1
CDD6P	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00004	18		
CDD6X	1995-NILU		W						841	0.00002	6		1
	1996-NILU		W						841	0.00002	18		1
CDD9X	1995-NILU		W						841	0.00002	6	2	1
	1996-NILU		W						841	0.00002	18		1
CDDO	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.0001	18		
CDDSN	1995-NILU		W						841	0.00002	5		
	1996-NILU		W						841	0.00001	18		3
CDDSP	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00004	18		
CDDST	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00001	18		
CDDSX	1995-NILU		W						841	0.00002	5		
	1996-NILU		W						841	0.00002	18		2
CDF2N	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00001	18		1
CDF2T	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00001	18		
CDF4X	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00002	18		1
CDF6P	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00004	18	2	1
CDF6X	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00002	18		1
CDF9P	1995-NILU		W						841	0.00002	6	2	1
	1996-NILU		W						841	0.00008	17	3	1
CDF9X	1995-NILU		W						841	0.00002	6	3	1
	1996-NILU		W						841	0.00002	18		1
CDFDN	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00001	18		1
CDFDX	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00002	18		1
CDFO	1995-NILU		W						841	0.00002	6		1
	1996-NILU		W						841	0.0001	18	3	1
CDFSN	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00001	18		1

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
CDFSP	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00008	18	6	1
CDFST	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00001	18		
CDFSX	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.00002	18		1
CHR	1992-NIVA		W	309	0.2	8			309	0.2	44		
	1995-NIVA		W						309	0.2	56		
	1996-NIVA		W						309	0.2	65		3
CHRTR	1995-NIVA		W						309	0.2	15		2
	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
CO	1996-NIVA		W						999	miss	3		
COR	1992-NIVA		W	309	0.2	8			309	0.2	46		
CR	1992-NIVA		W						312	10	6		
	1996-NIVA		W						999	miss	3		
CU	1983-SIIF	1G	W						130	10	12		
	1984-SIIF	1G	W						130	10	27		
	1986-NIVA	1H	D	311	150	56			311	150	20		
	1987-FIER	1G	W	404	50	37							
	1987-NIVA	1H	D	311	150	57			311	150	37		
	1988-NIVA	1H	D	311	150	61			311	150	55		
	1989-NIVA	1H	D	311	150	135							
	1989-NIVA	1H	W						311	150	36		
	1990-NIVA	1H	W	311	150	189			311	150	77		
	1991-NIVA	1H	W	311	50	193	2		311	50	67		
	1992-NIVA	1H	W	311	10	191			311	10	111		
	1993-NIVA	1H	W	311	10	221			311	10	79		
	1994-NIVA	1Z	W	311	10	302			311	10	81		
	1995-NIVA		W	311	10	318			311	10	124		
	1996-NIVA	V1	W						311	10	113		
	1996-NIVA	V2	W	311	10	368							
	1997-NIVA		W	311	5000a	287	1						
	1997-NIVA	AH	W						311	10	96		
	1998-NIVA		W	311	10	285							
	1998-NIVA	CF	W						311	10	51		
	1999-NIVA		W	311	10	235							
	1999-NIVA	EF	W						311	10	99		
	2000-NIVA		W	311	10	227							
	2000-NIVA	GS	W						311	10	51		
	2001-NIVA		W	311	10	261							
	2001-NIVA	IM	W						311	10	51		
DBA3A	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	71		48
	1996-NIVA		W						309	0.2	65		53
	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
DBP	1992-NIVA		W	309	0.2	8			309	0.2	46		
DBT	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
DBTC1	1995-NIVA		W						309	0.2	57		14
	1996-NIVA		W						309	0.2	65		9
DBTC2	1995-NIVA		W						309	0.2	56		9

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1996-NIVA		W						309	0.2	62		11
DBTC3	1995-NIVA		W						309	0.2	57		4
	1996-NIVA		W						309	0.2	65		5
DBTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6	2	
	2000-NIVA		W						320	0.5	23		
	2001-GALG		W						999	miss	11		
	2001-NIVA		W						320	0.5	16		1
DBTIO	1997-NIVA		W						309	0.5	34		
DDEPP	1982-VETN		W	210	50	53							
	1983-VETN	2E	W	210	50	48			211a	50	48		
	1984-VETN	2E	W	210	50	66							
	1985-VETN	2E	W	210	50	45							
	1986-NACE	2Z	W	510	20	56							
	1987-NACE	2Z	W	510	40	53							
	1988-NACE	2Z	W	510	40	61							
	1989-NACE	2Z	W	510	20	93							
	1990-NIVA		W	340	1	169			341	0.05	58		
	1991-NIVA		W	340	1	179			341	0.05	62		
	1992-NIVA		W	340	5	192	2		341	0.1	140		
	1993-NIVA		W	340	4	212	3		341	0.1	133		
	1994-NIVA	2Z	W	340	4	300			341	0.1	165	27	
	1995-NIVA		W	340	4	318	2		341	0.1	225	30	
	1996-NIVA		W	340	4	332	2		341	0.1	237	47	
	1997-NIVA		W	340	4	260	3		341	0.1	221	1	
	1998-NIVA		W	340	4	284	6						
	1998-NIVA	CH	W						341	0.1	203	4	
	1999-NIVA		W	340	4	249							
	1999-NIVA	EG	W						341	0.1	226	2	
	2000-NIVA		W	340	4	230	7						
	2000-NIVA	GU	W						341	0.1	179	6	
	2001-NIVA		W	340	4	250		1					
	2001-NIVA	IO	W						341	0.1	205	1	7
DDTEP	1983-SIIF		W						111	0.5	12		
	1984-SIIF		W						111	0.5	24		1
	1985-SIIF		W						111	0.5	27	1	5
	1986-SIIF		W						111	0.5	21		
	1987-SIIF		W						111	0.5	21	1	
	1988-SIIF		D						111	0.5	6		
	1988-SIIF		W						111	0.5	22	1	
	1989-SIIF		W						111	0.5	36	1	
	1990-SIIF		W						111	0.2	41	1	
	1991-SIIF		W						111	0.3	35		
DDTPP	1986-NACE		W	510	40	56							
	1987-NACE		W	510	40	53							
	1988-NACE		W	510	40	61							
	1989-NACE		W	510	20	93							
	1995-NIVA		W						340	0.05	72		
	1996-NIVA		W	340	0.05	54		4	340	0.05	45		
	1997-NIVA		W	340	2	32							
	1997-NIVA	AJ	W						340	0.05	48		
	1998-NIVA		W	340	2	37	1	8	340	0.05	68		24
	1999-NIVA		W	340	2	29		4	340	0.05	93		7
	2000-NIVA		W	340	2	22			340	0.05	48		6
	2001-NIVA		W	340	2	46		2	340	0.05	48		11
DPTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15	9	
	1999-NIVA		D						320	5	13	12	
	1999-NIVA		W						320	5	6	6	

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	2000-NIVA		W						320	0.5	23	1	1
	2001-NIVA		W						320	0.5	16		16
EOCL	1989-SIIF		W						605	170	5		
EPOCL	1986-NACE		W	610	800	56							
	1986-SIIF		W						605	5000	21	21	
	1987-NACE		W	610	800	53							
	1987-SIIF		W						605	40	20		
	1988-NACE		W	610	800	60							
	1988-SIIF		W						605	40	27		
	1989-NACE		W	610	800	89	1						
	1989-SIIF		W						605	40	35		
	1990-NIVA		W	615	40	117		3					
	1990-SIIF		W						605	40	41		
	1991-NIVA		W	615	40	116		12					
	1991-SIIF		W						605	130	35		
	1997-IFEN		W						607	50	6		
	1998-IFEN		W						607	1	6		
	2000-SINT		W						607	1	6		
	2001-SINT		W						607	1	6		
FLE	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	72		22
	1996-NIVA		W						309	0.2	65		6
	1997-NIVA	AL	W						309	0.5	34		
	1998-NIVA	CI	W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
FLU	1992-NIVA		W	309	0.2	8			309	0.2	44		
	1995-NIVA		W						309	0.2	72		
	1996-NIVA		W						309	0.2	65		
	1997-NIVA	AL	W						309	0.2	36		
	1998-NIVA	CI	W						309	0.2	39		
	1999-NIVA	EK	W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		
	2001-NIVA		W						309	0.2	42		
HCB	1983-SIIF		W						111	0.5	12		
	1983-VETN	2Z	W	210	10	48			211a	10	48		
	1984-SIIF		W						111	0.2	24		1
	1984-VETN	2Z	W	210	10	66							
	1985-SIIF		W						111	0.2	30	6	2
	1985-VETN	2Z	W	210	10	45		4					
	1986-NACE	2Z	W	510	10	56							
	1986-SIIF	2Z	W						111	0.2	21	3	
	1987-NACE	2Z	W	510	40	53							
	1987-SIIF	2Z	W						111	0.2	21	4	
	1988-NACE	2Z	W	510	40	61							
	1988-SIIF	2Z	D						111	0.2	6		
	1988-SIIF	2Z	W						111	0.2	22	2	
	1989-NACE	2Z	W	510	20	93							
	1989-SIIF	2Z	W						111	0.05	36		
	1990-NIVA		W	340	1	169	2		341	0.05	58		
	1990-SIIF	2Z	W						111	0.05	41	3	
	1991-NIVA		W	340	1	179	4	13	341	0.05	62	5	
	1991-SIIF	2Z	W						111	0.1	35		
	1992-NIVA		W	340	5	189	3		341	0.1	140		
	1993-NIVA		W	340	4	212	31		341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	24	1	341	0.05	165	33	
	1995-NIVA		W	340	3	317	37		341	0.05	225	30	
	1996-NIVA		W	340	3	332	52		341	0.05	237	37	
	1997-NIVA		W	340	2	260	39						
	1997-NIVA	AJ	W						341	0.05	221	7	

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1998-NIVA		W	340	2	284	48	13	341	0.05	203	67	2
	1999-NIVA		W	340	2	249	18						
	1999-NIVA	EG	W						341	0.05	226	18	8
	2000-NIVA		W	340	2	230	40						
	2000-NIVA	GU	W						341	0.05	180	43	1
	2001-NIVA		W	340	2	250	36	1	341	0.05	205	36	2
HCHA	1990-NIVA		W	340	1	168			341	0.05	58		
	1991-NIVA		W	340	1	179	2	111	341	0.05	62	5	10
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA		W	340	4	212	45	22	341	0.1	133		
	1994-NIVA	2Z	W	340	3	296	32	3	341	0.05	165	85	
	1995-NIVA		W	340	3	318	45		341	0.05	225	98	
	1996-NIVA		W	340	3	332	111		341	0.05	231	100	
	1997-NIVA		W	340	0.5	260	2	10	341	0.05	221	20	11
	1998-NIVA		W	340	0.5	284	8	208	341	0.05	202	25	121
	1999-NIVA		W	340	0.5	249	17	78	341	0.05	226	23	150
	2000-NIVA		W	340	0.5	230	31	62	341	0.05	180	42	78
	2001-NIVA		W	340	0.5	250	25	50	341	0.05	205	20	179
HCHG	1986-NACE		W	510	30	56	1						
	1986-SIIF		W						111	3	21		
	1987-NACE		W	510	40	53							
	1987-SIIF		W						111	5	21		1
	1988-NACE		W	510	40	61							
	1989-NACE		W	510	20	93							
	1989-SIIF		W						111	50	36		
	1990-NIVA		W	340	1	169	1	9	341	0.05	58		
	1990-SIIF		W						111	0.1	41		
	1991-NIVA		W	340	1	179	3	18	341	0.05	62	5	1
	1991-SIIF		W						111	0.3	35		
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA		W	340	4	212	42	17	341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	24	1	341	0.05	165	46	
	1995-NIVA		W	340	3	313	31		341	0.05	213	29	
	1996-NIVA		W	340	3	330	68		341	0.05	220	8	
	1997-NIVA		W	340	2	260	47						
	1997-NIVA	AJ	W						341	0.05	221	3	9
	1998-NIVA		W	340	2	284	25	63					
	1998-NIVA	AJ	W						341	0.05	203	10	23
	1999-NIVA		W	340	2	249	52	3	341	0.05	226	19	62
	2000-NIVA		W	340	2	230	65	29	341	0.05	180	27	9
	2001-NIVA		W	340	2	250	96	20	341	0.05	205	21	154
HG	1981-SIIF	1E	W	120	10	15		1	120	10	35		
	1982-SIIF	1E	W						120	10	18		
	1982-VETN		W	220	10	51			220	10	54		
	1983-SIIF	1E	W						120	10	17		
	1983-VETN	1Z	W						220	10	48		
	1984-FIER	1G	W						401	10	39		
	1984-SIIF	1G	W						120	10	27	6	
	1984-VETN	1Z	W						220	10	66		
	1985-SIIF	1G	D						120	10	30		
	1985-VETN	1Z	W						220	10	90		
	1986-NIVA	1H	D						310	10	74		
	1987-FIER	1G	W						401	10	38		
	1987-NIVA	1H	D						310	10	93		14
	1988-NIVA	1H	D						310	10	116		
	1989-NIVA	1H	D						310	100	134		
	1989-NIVA	1H	W						310	10	36	5	
	1990-NIVA	1H	W						310	10	266		
	1991-NIVA	1H	W						310	100a	264	126	
	1992-NIVA	1H	W						310	100a	303	122	
	1993-NIVA	1H	W						310	5	300		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1994-NIVA	1Z	W						310	5	381		
	1995-NIVA		W						310	5	442	1	
	1996-NIVA	V1	W						310	5	481		
	1997-NIVA	AH	W						310	5	383		
	1998-NIVA	CF	W						310	5	381		
	1999-NIVA		W	310	5	3							
	1999-NIVA	EF	W						310	5	386		
	2000-NIVA	GS	W						310	5	330		
	2001-NIVA	IM	W						310	5	356		
ICDP	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		29
	1996-NIVA		W						309	0.2	65		23
	1997-NIVA		W						309	0.5	36		
	1998-NIVA	CI	W						309	0.5	37	2	
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
MBTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6	6	
	2000-NIVA		W						320	0.5	23		
	2001-GALG		W						999	miss	11		
	2001-NIVA		W						320	0.5	16		5
MN	1984-SIIF		W						132	40	27		
	1985-SIIF		D						132	40	35		
MPTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15	9	
	1999-NIVA		D						320	5	13	13	
	1999-NIVA		W						320	5	6	6	
	2000-NIVA		W						320	0.5	23	3	
	2001-NIVA		W						320	0.5	16		15
NAP	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	70		21
	1996-NIVA		W						309	0.2	61		11
	1997-NIVA		W						309	0.2	34		1
	1998-NIVA	CI	W						309	0.2	37		
	1999-NIVA		W						309	0.2	34		1
	2000-NIVA		W						309	0.2	37		7
	2001-NIVA		W						309	0.2	41		4
NAP1M	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	15		13
	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	37		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	41		
NAP2M	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	15		13
	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	37		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	41		
NAPC1	1995-NIVA		W						309	0.2	55		6
	1996-NIVA		W						309	0.2	61		
NAPC2	1995-NIVA		W						309	0.2	57		6
	1996-NIVA		W						309	0.2	60		
NAPC3	1995-NIVA		W						309	0.2	57		5
	1996-NIVA		W						309	0.2	60		
NAPD2	1997-NIVA		W						309	0.5	34		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	41		
NAPD3	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	41		
NAPDI	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	15		6
	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	41		
NAPT2	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
NAPT3	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
NAPT4	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
NAPTM	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	15		11
	1997-NIVA		W						309	0.5	34		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
NI	1983-SIIF	1G	W						130	20	12		
	1992-NIVA		W						312	10	6		
	1996-NIVA		W						999	miss	3		
OCS	1990-NIVA		W	340	2	169	31	24	341	0.05	58		1
	1991-NIVA		W	340	2	179	14	81	341	0.05	62	5	8
	1992-NIVA		W	340	5	192	3		341	0.1	140		
	1993-NIVA		W	340	4	212	51	16	341	0.1	133		
	1994-NIVA		W	340	3	300	39	22	341	0.05	165	96	
	1995-NIVA		W	340	3	318	44		341	0.05	225	102	
	1996-NIVA		W	340	3	332	287		341	0.05	237	114	
	1997-NIVA		W	340	2	260	100		341	0.05	221	30	14
	1998-NIVA		W	340	2	277	132	101	341	0.05	203	182	1
	1999-NIVA		W	340	2	249	148	2	341	0.05	226	80	26
	2000-NIVA		W	340	2	230	140	21	341	0.05	180	103	58
	2001-NIVA		W	340	2	250	189	2	341	0.05	205	94	64
PA	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	72		
	1996-NIVA		W						309	0.2	65		
	1997-NIVA	AL	W						309	0.2	36		
	1998-NIVA	CI	W						309	0.2	39		
	1999-NIVA	EK	W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		
	2001-NIVA		W						309	0.2	42		

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter- calibr.	+basis	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
PAC1	1995-NIVA		W						309	0.2	57		1
	1996-NIVA		W						309	0.2	65		
PAC2	1995-NIVA		W						309	0.2	56		
	1996-NIVA		W						309	0.2	65		2
PADM1	2001-NIVA		W						309	0.5	42		
PADM2	2001-NIVA		W						309	0.5	42		
PAH	1987-NIVA		W	309	0.02	1							
PAM1	1992-NIVA		W	309	0.2	8			309	0.2	45		
	1995-NIVA		W						309	0.2	15		2
	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
PAM2	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA		W						309	0.5	34		
	2000-NIVA		W						309	0.5	38		
	2001-NIVA		W						309	0.5	42		
PB	1983-SIIF	1G	W						130	20	12		
	1984-SIIF	1G	W						130	20	27		2
	1985-SIIF	1G	D						130	20	35		
	1986-NIVA	1Z	D	312	150	56	4		312	150	20		
	1987-FIER	1G	W	403	10	37	1						
	1987-NIVA	1Z	D	312	150	57		12	312	150	37		
	1988-NIVA	1Z	D	312	150	61	17	3	312	150	55		
	1989-NIVA	1Z	D	312	150	135	9	9					
	1989-NIVA	1Z	W						312	150	36		
	1990-NIVA	1Z	W	312	50	187	3	1	312	150	77	3	
	1991-NIVA	1Z	W	312	50	193	14		312	50	67		
	1992-NIVA	1Z	W	312	50	191	119		312	50	111	2	
	1993-NIVA	1H	W	312	30	221	40		312	30	79		
	1994-NIVA	1Z	W	312	30	302	3		312	30	81		
	1995-NIVA		W	312	30	318	162	30	312	30	124		
	1996-NIVA	V1	W						312	30	110		
	1996-NIVA	V2	W	312	30	368		109					
	1997-NIVA		W	312	40	287	10	28	312	40	92		
	1998-NIVA		W	312	40	285	126	2					
	1998-NIVA	CF	W						312	40	90		
	1999-NIVA		W	312	40	235	118	11					
	1999-NIVA	EF	W						312	40	129	10	
	2000-NIVA		W	312	40	227	67	4					
	2000-NIVA	GS	W						312	40	87		
	2001-NIVA		W	312	40	261	156	6					
	2001-NIVA	IM	W						312	40	90		
PCB	1981-SIIF	2D	W	110	10	27			110	10	35		
	1982-SIIF	2D	W						111	5	17		
	1982-VETN		W	210	50	53			211	50	54		
	1983-SIIF	2E	W						111	5	14		
	1983-VETN	2E	W						211	50	48		
	1983-VETN	2Z	W	210	50	48							
	1984-SIIF	2E	W						111	5	24		
	1984-VETN	2E	W						211	50	66		
	1984-VETN	2Z	W	210	50	66							
	1985-SIIF	2E	W						111	5	32		6
	1985-VETN	2E	W						211	50	90		1
	1985-VETN	2Z	W	210	50	45							
	1986-NACE	2Z	W	511a	40a	56			511	20	56		
	1986-SIIF	2E	W						111	5	21		
	1987-NACE	2Z	W	510	40	53			511	20	54		
	1987-NIVA		W	340	0.1	2							

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1987-SIIF	2E	W						111	5	21		
	1988-NACE	2Z	W	510	40	61			511	20	13		
	1988-SIIF	2E	D						111	5	6		
	1988-SIIF	2E	W						111	5	22	4	
	1989-NACE	2Z	W	510	20	93			511	20	17		
	1989-SIIF	2E	W						111	5	36	6	
	1990-SIIF	2E	W						111	5	41		
	1991-SIIF	2E	W						111	5	35		
PCC26	1996-NILU		W						842	0.001	6		
PCC32	1996-NILU		W						842	0.003	6		4
PCC50	1996-NILU		W						842	0.001	6		
PCC62	1996-NILU		W						842	0.025	6		6
PCDD	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.0001	18		
PCDF	1995-NILU		W						841	0.00002	6		
	1996-NILU		W						841	0.0001	18		
PER	1992-NIVA		W	309	0.2	8			309	0.2	46		
	1995-NIVA		W						309	0.2	72		32
	1996-NIVA		W						309	0.2	65		40
	1997-NIVA		W						309	0.5	36		
	1998-NIVA		W						309	0.5	39		
	1999-NIVA	EK	W						309	0.5	34		
	2000-NIVA		W						309	0.5	39		
	2001-NIVA		W						309	0.5	42		
PYR	1992-NIVA		W	309	0.2	8			309	0.2	44		
	1995-NIVA		W						309	0.2	72		4
	1996-NIVA		W						309	0.2	65		1
	1997-NIVA	AL	W						309	0.2	36		
	1998-NIVA	CI	W						309	0.2	39		
	1999-NIVA	EK	W						309	0.2	34		
	2000-NIVA		W						309	0.2	39		
	2001-NIVA		W						309	0.2	42		
QCB	1990-NIVA		W	340	2	169	33	39	341	0.05	58		
	1991-NIVA		W	340	2	178	13	97	341	0.05	57	5	7
	1992-NIVA		W	340	5	192	3		341	0.1	125		
	1993-NIVA		W	340	4	212	52	24	341	0.1	133		
	1994-NIVA		W	340	3	299	38	23	341	0.05	165	93	
	1995-NIVA		W	340	3	318	45		341	0.05	225	103	
	1996-NIVA		W	340	3	332	306		341	0.05	237	109	
	1997-NIVA		W	340	2	260	79		341	0.05	221	27	10
	1998-NIVA		W	340	2	284	121	101	341	0.05	203	171	1
	1999-NIVA		W	340	2	242	185	2	341	0.05	226	84	14
	2000-NIVA		W	340	2	230	198	1	341	0.05	180	123	1
	2001-NIVA		W	340	2	232	216	1	341	0.05	205	95	62
SE	1982-VETN		W	240	10	46			240	10	54		
TBTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6		
	2000-NIVA		W						320	0.5	23		
	2001-GALG		W						999	miss	11		
	2001-NIVA		W						320	0.5	16		
TCDD	1995-NILU		W						841	0.00002	6	1	
	1996-NILU		W						841	0.00001	18		
TDEPP	1991-NIVA		W	340	1	138		1	341	0.05	62		
	1992-NIVA		W	340	5	191	3		341	0.1	140		
	1993-NIVA		W	340	4	212	24	3	341	0.1	133		
	1994-NIVA	2Z	W	340	3	300	17	5	341	0.05	165	47	
	1995-NIVA		W	340	3	318	36		341	0.05	222	51	
	1996-NIVA		W	340	3	332	23		341	0.05	237	16	
	1997-NIVA		W	340	3	260	23						

Tissue				Fish liver					Fish fillet, Shrimp tail, Mussel, Other				
Contamin.	Mon. Year Lab.	Inter-calibr. +basis		Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim	Analys method code	Detect limit (ppb)	Total value count	Count below d.lim	N (<) above d.lim
	1997-NIVA	AJ	W						341	0.05	221	11	
	1998-NIVA		W	340	3	278	19	26					
	1998-NIVA	CH	W						341	0.05	203	1	44
	1999-NIVA		W	340	3	249	6	1					
	1999-NIVA	EG	W						341	0.05	226	2	71
	2000-NIVA		W	340	3	230	35	4					
	2000-NIVA	GU	W						341	0.05	179	11	67
	2001-NIVA		W	340	3	250	24	3	341	0.05	205	1	101
TPTIN	1997-NIVA		D						320	5	8		
	1998-NIVA		D						320	5	15		5
	1999-NIVA		D						320	5	13		
	1999-NIVA		W						320	5	6	4	
	2000-NIVA		W						320	0.5	23		
	2001-GALG		W						999	miss	11		5
	2001-NIVA		W						320	0.5	16		9
V	1996-NIVA		W						999	miss	3		
ZN	1983-SIIF	1G	W						131	400	12		
	1984-SIIF	1G	W						132	400	27		
	1985-SIIF	1G	D						132	400	35		
	1986-NIVA	1H	D	311	3000	56			311	3000	20		
	1987-FIER	1G	W	405	20	37							
	1987-NIVA	1H	D	311	3000	57			311	3000	37		
	1988-NIVA	1H	D	311	3000	61			311	3000	55		
	1989-NIVA	1H	D	311	3000	135		1					
	1989-NIVA	1H	W						311	3000	36		
	1990-NIVA	1H	W	311	3000	189			311	3000	77		
	1991-NIVA	1H	W	311	1000	193			311	1000	67		
	1992-NIVA	1H	W	311	1000	191			311	1000	111		
	1993-NIVA	1H	W	311	1000	221			311	1000	79		
	1994-NIVA	1Z	W	311	1000	302			311	1000	81		
	1995-NIVA		W	311	1000	318			311	1000	142		
	1996-NIVA	V1	W						311	1000	131		
	1996-NIVA	V2	W	311	1000	368							
	1997-NIVA		W	311	1000	287							
	1997-NIVA	AH	W						311	1000	110		
	1998-NIVA		W	311	1000	285							
	1998-NIVA	CF	W						311	1000	51		
	1999-NIVA		W	311	1000	235							
	1999-NIVA	EF	W						311	1000	99		
	2000-NIVA		W	311	1000	227							
	2000-NIVA	GS	W						311	1000	51		
	2001-NIVA		W	311	1000	261							
	2001-NIVA	IM	W						311	1000	51		
Sum of counts						67305	9037	2364			60028	4925	4592

a(7) > ambigous value (Maximum value displayed)

Appendix D
Participation in intercalibration exercises

Participation in intercalibration exercises other than QUASIMEME

Sea water:

4H	ICES/JMG Fifth Round Intercalibration on Trace Metals in Sea Water - Section 4, analysis for Hg - 1983 - (5/TM/SW:4).
4I	JMG Sixth Intercalibration on Trace Metals in Estuarine Waters - 1986 - (6/TM/SW).
4Z	Intercalibration exercise for SIIF/SERI (Cd) and NIVA/IAMK (IAMK=Chalmers Inst., Göteborg) - 1985.

Seabed sediment:

7E	ICES, First Intercalibration Exercise on Trace metals in Marine Sediments - 1984 - (1/TM/MS).
8B	ICES/OSPAR, First Intercomparison Exercise on Organochlorines (individual chlorobiphenyl congeners) in Marine Sediments - Phase 1, analysis of standard solutions - 1989 - (1/OC/MS:1).
8C	ICES/OSPAR, First Intercomparison Exercise on Organochlorines (individual chlorobiphenyl congeners) in Marine Sediments - Phase 2, analysis of standard solutions - 1991 - (1/OC/MS:2).
8B	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 1 - (analysis of standard solutions) - 1989 - (1/OC/MS-1).
8C	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 2 - 1990 - (1/OC/MS-2).
8D	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3a (1/OC/MS-3a) 1991.
8E	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3b - (1/OC/MS-3b) 1992.
8F	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 4 - (1/OC/MS-4) 1993.

Marine biota:

1E	ICES, Fifth Intercalibration Exercise on Trace Metals in Biological Tissues - 1978 - (5/TM/BT).
1F	ICES, Sixth Intercalibration Exercise on Trace Metals (Cadmium and Lead only) in Biological Tissues - 1979 - (6/TM/BT).
1G	ICES, Seventh Intercalibration Exercise on Trace Metals in Biological Tissues - Part A - 1983 - (7/TM/BT).
1H	ICES, Seventh Intercalibration Exercise on Trace Metals in Biological Tissues - Part B - 1985 - (7/TM/BT) (preliminary report 1987).
1Z VETN	Interlabcalibration exercise with VETN and SIIF 1983, mercury and cadmium in cod filet and liver.

1Z NIVA	Interlabcalibration exercise with VETN, NACE and NIVA 1986 (Hg, Cd, Cu, Pb and Zn in 6 samples).
2D	ICES Fourth Intercalibration Exercise on Organochlorines (mainly PCBs) in Biological Tissues (Sample No.5) - 1979 - (4/OC/BT).
2E	ICES Fifth Intercalibration Exercise on Organochlorines (PCBs only) in Biological Tissues - 1982 - (5/OC/BT).
2G	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 1 - (analysis of standard solutions) - 1989 - (7/OC/BT-1).
2H	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 2 - 1990 - (7/OC/BT-2).
2I	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3a - (7/OC/BT-3a) 1991.
2J	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 3b - (7/OC/BT-3b) 1992.
2K	ICES/IOC/OSPAR Intercomparison Programme on the Analysis of Chlorobiphenyls in Marine Media - Step 4 - (7/OC/BT-4) 1993.
2Z VETN	Interlabcalibration exercise with VETN among others, 1983, PCB and HCB in cod liver.
2Z NACE	Interlabcalibration exercise with NACE, VETNand SIIF 1986 (PCB (all labs), DDE, OCS, HCB and DCB (NACE and VETN).

Participation in QUASIMEME intercalibration exercises

IC	Code	Year	No.	Group	Matrix
QM	QOR002BT	1993	80	BT-2	CB's in standard solution and biota - Fish oil
V1	QTM028BT	1996	280	BT-1	Trace metals in cod muscle and cod liver
V2	QTM029BT	1996	280	BT-1	Trace metals in cod muscle and cod liver
AJ	QOR054BT	1997	347	BT-2	Chlorobiphenyls and organochlorine pesticides in biota
AL	QPH008BT	1997	348	BT-4	PAHs in biota
AH	QTM036BT	1997	346	BT-1	Metals in biota
CI	QPH010BT	1998	394	BT-4	Polyaromatic hydrocarbons in biota
CH	QOR059BT	1998	393	BT-2	Chlorobiphenyls and organochlorine pesticides in Biota
CF	QTM042BT	1998	392	BT-1	Trace metals in Biota
EF	QTM046BT	1999	433	BT-1	Trace metals in biota
EG	QOR062BT	1999	434	BT-2	Chlorobiphenyls and organochlorine pesticides in biota
EK	QPH012BT	1999	435	BT-4	Polyaromatic hydrocarbons in biota
GU	QOR066BT	2000	473	BT-2	Chlorobiphenyls and organochlorine pesticides in biota
GS	QTM049BT	2000	472	BT-1	Trace metals in biota
IO	QOR070BT	2001	510	BT-2	Chlorobiphenyls and organochlorine pesticides in biota
IM	QTM053BT	2001	509	BT-1	Trace metals in biota

Appendix E
Overview of localities and sample counts 1981-2001

Station positions are shown on maps in Appendix F

jmpco: JAMP area code (J99 = unclassified)
jmpst: station code
stnam: station code
Lon: Longitude
Lat: Latitude
icear: ICES area
speci: species code (English, Norwegian (Latin))
MYTI EDU - blue mussel, blåskjell (*Mytilus edulis*)
BROS BRO - tusk, brosme (*Brosme brosme)*
CHIM MON - rat fish, havmus (*Chimaera monstrosa*)
GADU MOR - Atlantic cod, torsk (*Gadus morhua*)
LEPI WHI - megrim, glassvar (*Lepidorhombus whiff-iagonis*)
LIMA LIM - dab, sandflyndre (*Limanda limanda*)
MICR KIT - lemon sole, lomre (*Microstomus kitt*)
MOLV MOL - ling, lange (*Molva molva*)
PAND BOR - shrimp, reker (*Pandalus borealis)*
PLAT FLE - flounder, skrubbe (*Platichthys flesus*)
PLEU PLA - plaice, rødspette (*Pleuronectes platessa*)
tissu: tissue:
SB - soft body
LI - liver
MU - fillet
TM - tail muscle

STATIONS AND SAMPLE COUNT FOR BIOTA

jmpco	jmpst	stnam	lat	lon	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
J26	01A	Sponvika	59° 5.10	11° 13.90	47G13	MYTI EDU	SB		3			3					3											
J26	02A	Fugleskjær	59° 6.90	10° 59.0	47G09	MYTI EDU	SB		3			3					3											
J26	03A	Tisler	58° 58.80	10° 57.50	46G07	MYTI EDU	SB		2			3					3											
J26	301	Akershuskaia	59° 54.23	10° 45.47	48G07	MYTI EDU	SB												2									
J26	302	Ormøya	59° 52.69	10° 45.46	48G07	MYTI EDU	SB												2									
J26	303	Malmøya	59° 51.78	10° 45.95	48G07	MYTI EDU	SB												2									
J26	304	Gåsøya	59° 51.11	10° 35.51	48G04	MYTI EDU	SB												3									
J26	305	Lysaker	59° 54.36	10° 38.60	48G04	MYTI EDU	SB												2									
J26	306	Håøya	59° 42.69	10° 33.35	48G05	MYTI EDU	SB												3									
J26	30A	Gressholmen	59° 52.75	10° 43.0	48G07	MYTI EDU	SB				3	3	3	4	3	3	3	3	3	3	3	3	4	3	3	3	3	3
J26	30B	Oslo City area	59° 49.0	10° 33.0	48G05	GADU MOR	LI				29	25	25	25	25	25	25	24	21	24	25	25	50	50	50	25	25	25
J26	30B	Oslo City area	59° 49.0	10° 33.0	48G05	GADU MOR	MU				29	25	25	25	26	26	30	30	21	29	30	30	60	60	60	30	30	30
J26	30F	Oslo City area	59° 47.0	10° 34.0	48G05	PLEU PLA	LI												2		5	5						
J26	30F	Oslo City area	59° 47.0	10° 34.0	48G05	PLEU PLA	MU												2		5	5						
J26	30G	Spro	59° 45.80	10° 34.50	48G05	PAND BOR	TM															1						
J26	30H	Storegrunn	59° 48.50	10° 33.50	48G05	PAND BOR	TM															1						
J26	30X	West of Nesodden	59° 48.50	10° 36.0	48G05	GADU MOR	LI												22									
J26	30X	West of Nesodden	59° 48.50	10° 36.0	48G05	GADU MOR	MU												22									
J26	40C	Steilene	59° 49.0	10° 33.0	48G05	PAND BOR	TM				1								2									
J26	31A	Solbergstrand	59° 36.90	10° 39.40	48G06	MYTI EDU	SB	2		6	3	3	3	3	3	3	3	3	3	3	3	2	4	3	3	3	3	3
J26	31B	Solbergstrand	59° 36.90	10° 39.40	48G06	GADU MOR	LI	10	27																			
J26	31B	Solbergstrand	59° 36.90	10° 39.40	48G06	GADU MOR	MU	10	27																			
J26	31B	Solbergstrand	59° 36.90	10° 39.40	48G06	PLAT FLE	LI	8																				
J26	31B	Solbergstrand	59° 36.90	10° 39.40	48G06	PLAT FLE	MU	8																				
J26	31C	Solbergstrand	59° 36.90	10° 39.40	48G06	PAND BOR	TM				1																	
J26	32A	Rødtangen	59° 31.50	10° 25.60	48G06	MYTI EDU	SB	1	3			3																
J26	33B	Sande (east side)	59° 31.70	10° 21.0	48G06	PLAT FLE	LI			25		1	23	1	26	1	5	5	5	5	5	5	15	15	13	5	5	30
J26	33B	Sande (east side)	59° 31.70	10° 21.0	48G06	PLAT FLE	MU			25		25	1	1	26	1	5	5	5	5	5	5	15	15	13	5	5	30
J26	33C	Sande	59° 31.70	10° 21.0	48G06	PAND BOR	TM						1															
J26	33X	Sande (west side)	59° 31.70	10° 20.40	48G06	PLAT FLE	LI										3											
J26	33X	Sande (west side)	59° 31.70	10° 20.40	48G06	PLAT FLE	MU										3											
J26	35A	Mølen	59° 29.20	10° 30.10	47G04	MYTI EDU	SB	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

jmpco	jmpst	stnam	lat	lon	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
J26	35C	Holmestrand-Mølen	59° 29.20	10° 30.10	47G04	PAND BOR	TM		1						1		2											
J26	35C	Holmestrand-Mølen	59° 29.20	10° 30.10	47G04	PAND BOR	XX								1													
J26	36A	Færder	59° 1.60	10° 31.70	47G06	MYTI EDU	SB	1		5	3	3	3	3	3	3	3	3	3	3	3	3	5	3	3	3	3	3
J26	36B	Færder	59° 2.0	10° 32.0	47G06	GADU MOR	LI	10	27	23	24	14	25	25	25	25	24	25	25	25	25	25	25	25	25	25	23	25
J26	36B	Færder	59° 2.0	10° 32.0	47G06	GADU MOR	MU	10	27	23	24	14	25	25	26	26	29	30	30	30	30	30	30	30	30	30	27	30
J26	36F	Færder area	59° 4.0	10° 23.0	47G06	LIMA LIM	LI										5	5	5	5	5	5	5	5	5	5	5	30
J26	36F	Færder area	59° 4.0	10° 23.0	47G06	LIMA LIM	MU										5	5	5	5	5	5	5	5	5	5	5	30
J26	73A	Lyngholmen	59° 2.60	10° 18.10	47G03	MYTI EDU	SB										3											
J26	74A	Oddneskjær	58° 57.30	9° 52.10	46F97	MYTI EDU	SB										3											
J26	71A	Bjørkøya (Risøyodd.)	59° 1.40	9° 45.40	47F99	MYTI EDU	SB	1	3	3	3	2	3	3	3	3	3	3	3	3	3	3	4	3	3	3	3	3
J99	76A	Risøy	58° 43.60	9° 17.0	46F92	MYTI EDU	SB										3	3	3	3			3	3	3	3	3	3
J99	77A	Flostafjord	58° 31.50	8° 56.90	46F89	MYTI EDU	SB										3	3										
J99	77B	Borøy area	58° 33.0	9° 1.0	45F93	GADU MOR	LI										14	25										
J99	77B	Borøy area	58° 33.0	9° 1.0	45F93	GADU MOR	MU										17	30										
J99	77B	Borøy area	58° 33.0	9° 1.0	45F93	LIMA LIM	LI											3										
J99	77C	Borøy area	58° 29.0	9° 10.0	45F91	PAND BOR	TM										2											
J99	79A	Gjerdsvoldsøyen east	58° 24.80	8° 45.30	45F87	MYTI EDU	SB										3	3										
J99	13A	Langøsund	57° 59.80	7° 34.60	45F74	MYTI EDU	SB										1	4										
J99	14A	Aavigen	58° 2.20	7° 13.20	45F73	MYTI EDU	SB										3	4										
J99	15A	Gåsøy	58° 3.7	6° 53.16	45F69	MYTI EDU	SB										4	4		3	3	4	4	3	3	3	3	3
J99	15B	Ullerø area	58° 3.0	6° 43.0	45F69	GADU MOR	LI										25	24	23	30	23	25	25	25	25	25	25	25
J99	15B	Ullerø area	58° 3.0	6° 43.0	45F69	GADU MOR	MU										30	29	27	30	28	29	30	30	30	30	30	30
J99	15F	Ullerø area	58° 3.0	6° 43.0	45F69	LIMA LIM	LI											3		2	4	5	5	5	5	5	5	30
J99	15F	Ullerø area	58° 3.0	6° 43.0	45F69	LIMA LIM	MU											3		2	4	5	5	5	5	5	5	30
J99	15F	Ullerø area	58° 3.0	6° 43.0	45F69	PLEU PLA	LI												3	2								
J99	15F	Ullerø area	58° 3.0	6° 43.0	45F69	PLEU PLA	MU												3	2								
J99	15F	Ullerø area	58° 3.0	6° 43.0	45F69	MICR KIT	LI														1							
J99	15F	Ullerø area	58° 3.0	6° 43.0	45F69	MICR KIT	MU														1							
J63	51A	Byrkjenes	60° 5.10	6° 33.10	49F66	MYTI EDU	SB							3	3							1	3	3	3	6	3	3
J63	52A	Eitrheimsneset	60° 5.80	6° 32.20	49F66	MYTI EDU	SB									3	3	3	3	2	3	3	3	3	3	6	3	3
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	GADU MOR	LI							13	26	12	25	25	22	25	25	25	50	30	30	25	25	25
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	GADU MOR	MU							12	26	15	30	30	26	30	30	30	56	36	36	30	30	30
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	PLAT FLE	LI				22				22	30	5	5	5	5	4	4	11	15	11	5	2	30
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	PLAT FLE	MU				22				22	30	5	5	5	5	4	4	11	15	11	5	2	30
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	GLYP CYN	LI							3														

jmpco	jmpst	stnam	lat	lon	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	GLYP CYN	MU							3														
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	SALM TRU	LI										12											
J63	53B	Inner Sørfjord	60° 10.0	6° 34.0	49F65	SALM TRU	MU										12											
J63	53D	Digraneset	60° 11.0	6° 34.5	49F65	BROS BRO	LI																					24
J63	53D	Digraneset	60° 11.0	6° 34.5	49F65	BROS BRO	MU																					24
J63	53D	Digraneset	60° 11.0	6° 34.5	49F65	MOLV MOL	LI																					30
J63	53D	Digraneset	60° 11.0	6° 34.5	49F65	MOLV MOL	MU																					30
J63	53D	Digraneset	60° 11.0	6° 34.5	49F65	CHIM MON	LI																					12
J63	53D	Digraneset	60° 11.0	6° 34.5	49F65	CHIM MON	MU																					12
J63	56A	Kvalnes	60° 13.40	6° 36.10	49F65	MYTI EDU	SB							3	15	3	3	3	3	3	3	3	3	3	3	6	3	3
J63	56D	Kvalnes	60° 15.00	6° 36.00	49F65	BROS BRO	LI																			3		
J63	56D	Kvalnes	60° 15.00	6° 36.00	49F65	BROS BRO	MU																			3		
J63	56D	Kvalnes	60° 15.00	6° 36.00	49F65	MOLV MOL	LI																			1		
J63	56D	Kvalnes	60° 15.00	6° 36.00	49F65	MOLV MOL	MU																			1		
J63	56D	Kvalnes	60° 15.00	6° 36.00	49F65	CHIM MON	LI																			1		
J63	56D	Kvalnes	60° 15.00	6° 36.00	49F65	CHIM MON	MU																			1		
J99	227X	Høievarde	59° 19.43	5° 19.11	47F52	MYTI EDU	SB																				3	3
J99	226X	Karmsund bridge (east)	59° 22.68	5° 17.91	47F51	MYTI EDU	SB																		1	3	3	
J99	222A	Kopervik harbour	59° 17.2	5° 18.94	47F52	MYTI EDU	SB																				3	
J63	5610	Kvalnes, north	60° 13.60	6° 36.45	49F65	MYTI EDU	SB																			3		
J63	5620	Kjeken, near Helland	60° 20.58	6° 39.50	49F64	MYTI EDU	SB																			3		
J63	5710	Urdhem, s. of Krossanes	60° 22.17	6° 40.65	49F67	MYTI EDU	SB																			3		
J63	57A	Krossanes	60° 23.20	6° 41.20	49F67	MYTI EDU	SB							3	3	3	3	3	3	3	3	3	3	3	3	6	3	3
J62	63A	Ranaskjær	60° 25.10	6° 24.50	49F64	MYTI EDU	SB							3	3	3	3	3	3	3	3	3	3	3	3	6	3	3
J62	65A	Vikingneset	60° 14.50	6° 9.60	49F62	MYTI EDU	SB							3	15	3	3	3	3	3	3	3	3	3	3	6	3	3
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	GADU MOR	LI							22	26	22	16	19	8	12	18	25	35	25	25	25	25	25
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	GADU MOR	MU							22	26	23	16	24	9	14	22	30	40	30	30	30	30	30
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	PLAT FLE	LI																3		4	5	5	30
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	PLAT FLE	MU																3		4	5	5	30
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	LIMA LIM	LI																		5			
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	LIMA LIM	MU																		5			
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	LEPI WHI	LI				19			1	26	30	5	5	3	5	5	5	5	5	5	5	5	30
J62	67B	Strandebarm	60° 16.0	6° 2.0	49F62	LEPI WHI	MU				19			1	26	30	5	5	3	5	5	5	5	5	5	5	5	30
J62	69A	Lille Terøy	59° 58.79	5° 45.35	48F57	MYTI EDU	SB												3	1	3	3	3	3	3	6	3	3
J99	21F	Åkrefjord	59° 45.0	6° 7.0	48F62	PLAT FLE	LI																			3	5	30

jmpco	jmpst	stnam	lat	lon	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
J99	21F	Åkrefjord	59° 45.0	6° 7.0	48F62	PLAT FLE	MU																			3	5	30
J99	21F	Åkrefjord	59° 45.0	6° 7.0	48F62	LEPI WHI	LI																			5		
J99	21F	Åkrefjord	59° 45.0	6° 7.0	48F62	LEPI WHI	MU																			5		
J99	21D	Åkrafjord	59° 48.0	6° 11.0	48F62	BROS BRO	LI																			1		24
J99	21D	Åkrafjord	59° 48.0	6° 11.0	48F62	BROS BRO	MU																			1		24
J99	21D	Åkrafjord	59° 48.0	6° 11.0	48F62	MOLV MOL	LI																			1		24
J99	21D	Åkrafjord	59° 48.0	6° 11.0	48F62	MOLV MOL	MU																			1		24
J99	21D	Åkrafjord	59° 48.0	6° 11.0	48F62	CHIM MON	LI																			1		12
J99	21D	Åkrafjord	59° 48.0	6° 11.0	48F62	CHIM MON	MU																			1		12
J99	22A	Espevær, west	59° 35.20	5° 8.50	48F53	MYTI EDU	SB										3	3	3	3	3	3	5	3	3	3	3	3
J99	22C	Bømlofjord	59° 34.0	5° 11.0	48F53	PAND BOR	TM										2											
J99	22F	Borøyfjorden	59° 43.0	5° 21.0	48F55	LIMA LIM	LI										5	5	4		5	2						
J99	22F	Borøyfjorden	59° 43.0	5° 21.0	48F55	LIMA LIM	MU										5	5	4		5	2						
J99	22F	Borøyfjorden	59° 43.0	5° 21.0	48F55	PLEU PLA	LI																5	5	5			
J99	22F	Borøyfjorden	59° 43.0	5° 21.0	48F55	PLEU PLA	MU																5	5	5			
J99	22F	Borøyfjorden	59° 43.0	5° 21.0	48F55	MICR KIT	LI													5								
J99	22F	Borøyfjorden	59° 43.0	5° 21.0	48F55	MICR KIT	MU													5								
J99	23A	Austvik	59° 52.20	5° 6.60	48F51	MYTI EDU	SB										3	3										
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	GADU MOR	LI										25	25	25	25	26	25	25	25	25	25	25	25
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	GADU MOR	MU										30	30	30	30	30	30	30	30	30	30	30	30
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	PLAT FLE	LI														1							
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	PLAT FLE	MU														1							
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	PLEU PLA	LI														3							
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	PLEU PLA	MU														3							
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	MICR KIT	LI														1	4						
J99	23B	Karihavet area	59° 55.0	5° 7.0	48F51	MICR KIT	MU														1	4						
J99	24A	Vardøy	60° 10.20	5° 0.80	49F52	MYTI EDU	SB										3	3										
J65	80A	Østmarknes	63° 27.50	10° 27.50	55G04	MYTI EDU	SB				1	2																
J65	81A	Biologisk Stasjon	63° 26.50	10° 21.40	55G04	MYTI EDU	SB				1																	
J65	82A	Flakk	63° 27.10	10° 12.60	55G01	MYTI EDU	SB				1	2	2	3	1	2		3	2	2		3	3					
J65	83A	Frøsetskjær	63° 25.50	10° 7.80	55G01	MYTI EDU	SB				1																	
J65	84A	Trossavika	63° 20.80	9° 57.80	55F97	MYTI EDU	SB				2	3	3	3	3	3		3	3	3		3	3					
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	GADU MOR	LI				13	1	1	1	5													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	GADU MOR	MU				13	10	1	1	5													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	MICR KIT	LI								3													

jmpco	jmpst	stnam	lat	lon	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	MICR KIT	MU								3													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	MELA AEG	LI						14	1	4													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	MELA AEG	MU						1	1	5													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	MERL MNG	LI							1	7													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	MERL MNG	MU							1	7													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	POLL POL	LI					1	1		8													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	POLL POL	MU					16	1		8													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	POLL VIR	LI								4													
J65	84B	Trossavika	63° 20.80	9° 57.80	55F97	POLL VIR	MU								4													
J65	85A	Geitstrand	63° 21.90	9° 56.30	55F97	MYTI EDU	SB				1																	
J65	86A	Geitnes	63° 26.60	9° 59.20	55F97	MYTI EDU	SB				1																	
J65	87A	Ingdalsbukt	63° 27.80	9° 54.80	55F97	MYTI EDU	SB				1	1	1	1	1	1		1	2	1		2	2					
J65	88A	Rødberg	63° 29.20	10° 0.0	55G01	MYTI EDU	SB				1	1																
J99	25A	Hinnøy	61° 22.20	4° 52.80	51F47	MYTI EDU	SB												3	3								
J99	26A	Hamnen	61° 52.70	5° 13.60	52F51	MYTI EDU	SB												6	3								
J99	27A	Grinden	62° 12.20	5° 25.40	53F55	MYTI EDU	SB												2									
J99	28A	Eiksundet	62° 15.0	5° 51.60	53F58	MYTI EDU	SB												6	3								
J99	91A	Nerdvika	63° 21.20	8° 9.60	55F81	MYTI EDU	SB												4	3	3							
J99	92A	Stokken	64° 2.21	10° 1.10	57G03	MYTI EDU	SB												7	3	3	3	3	3				
J99	92B	Stokken area	64° 9.85	9° 53.0	57F99	GADU MOR	LI													25	24	25	25					
J99	92B	Stokken area	64° 9.85	9° 53.0	57F99	GADU MOR	MU													30	29	30	30					
J99	92B	Stokken area	64° 9.85	9° 53.0	57F99	LIMA LIM	LI															1						
J99	92B	Stokken area	64° 9.85	9° 53.0	57F99	LIMA LIM	MU															1						
J99	92B	Stokken area	64° 9.85	9° 53.0	57F99	PLEU PLA	LI															1						
J99	92B	Stokken area	64° 9.85	9° 53.0	57F99	PLEU PLA	MU															1						
J99	93A	Sætervik	64° 23.68	10° 29.0	57G04	MYTI EDU	SB												7	3								
J99	94A	Landfast	65° 38.40	12° 0.50	60G23	MYTI EDU	SB												3	3								
J99	95A	Flatskjær	66° 42.60	13° 15.80	62G32	MYTI EDU	SB												3	3								
J99	96A	Breiviken	66° 17.60	12° 50.50	61G28	MYTI EDU	SB												6	3								
J99	97A	Klakholmen	67° 39.90	14° 44.60	64G49	MYTI EDU	SB												4	3								
J99	98A	Svolvær området	68° 16.90	14° 40.10	65G48	MYTI EDU	SB												4	3				3	3	3	3	3
J99	98B	Lille Molla	68° 12.0	14° 48.0	65G48	GADU MOR	LI												25	29	25	24	25	25	25	25	25	25
J99	98B	Lille Molla	68° 12.0	14° 48.0	65G48	GADU MOR	MU												30	29	30	29	30	30	30	30	30	30
J99	98B	Lille Molla	68° 12.0	14° 48.0	65G48	LIMA LIM	LI													4								
J99	98B	Lille Molla	68° 12.0	14° 48.0	65G48	LIMA LIM	MU													4								

jmpco	jmpst	stnam	lat	lon	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	LIMA LIM	LI														1	1	5					
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	LIMA LIM	MU														1	1	5					
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	PLEU PLA	LI													3		5		4	5	1	4	30
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	PLEU PLA	MU													3		5		4	5	1	4	30
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	MICR KIT	LI														1	1						
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	MICR KIT	MU														1	1						
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	GLYP CYN	LI															1						
J99	98F	Lille Molla	68° 12.0	14° 48.0	65G48	GLYP CYN	MU															1						
J99	98X	Skrova	68° 10.50	14° 40.15	65G48	MYTI EDU	SB														3	4	4					
J99	99A	Brunvær	68° 0.30	15° 5.60	65G53	MYTI EDU	SB												7	3								
J99	41A	Fensneset,Grytøya	68° 56.90	16° 38.47	66G64	MYTI EDU	SB														3	3	4	3				
J99	42A	Tennskjær,Malangen	69° 28.60	18° 18.0	67G81	MYTI EDU	SB														3	3						
J99	43A	Lyngneset,Langfjord	70° 6.20	20° 32.79	69H06	MYTI EDU	SB														3	3		3				
J99	43B	Kvænangen	70° 9.0	21° 22.0	69H16	GADU MOR	LI														25	25	25					
J99	43B	Kvænangen	70° 9.0	21° 22.0	69H16	GADU MOR	MU														30	30	30					
J99	43F	Kvænangen,Olderfjord	70° 9.0	21° 22.0	69H16	LIMA LIM	LI																3					
J99	43F	Kvænangen,Olderfjord	70° 9.0	21° 22.0	69H16	LIMA LIM	MU																3					
J99	43F	Kvænangen,Olderfjord	70° 9.0	21° 22.0	69H16	MICR KIT	LI																1					
J99	43F	Kvænangen,Olderfjord	70° 9.0	21° 22.0	69H16	MICR KIT	MU																1					
J99	44A	Elenheimsundet	70° 30.97	22° 14.80	70H23	MYTI EDU	SB														3	3	4	3				
J99	45A	Yttre Sauhamnneset	70° 45.81	24° 19.22	70H42	MYTI EDU	SB														3	3						
J99	46A	Smines ved Altesula	70° 58.38	25° 48.14	70H57	MYTI EDU	SB														3	3	5					
J99	46B	Hammerfest area	70° 50.0	23° 44.0	70H37	GADU MOR	LI														24	25						
J99	46B	Hammerfest area	70° 50.0	23° 44.0	70H37	GADU MOR	MU														29	30						
J99	47A	Kifjordneset	70° 52.89	27° 22.17	70H74	MYTI EDU	SB														3	3						
J99	48A	Trollfjorden i Tanafjord	70° 41.61	28° 33.28	70H85	MYTI EDU	SB														3	3	3					
J99	49A	Nordfjorden,Syltefj.	70° 33.10	30° 5.17	70J03	MYTI EDU	SB														3	3						
J99	10A	Skallneset	70° 8.3	30° 21.7	69J06	MYTI EDU	SB														3	3	4	3	3	3	3	3
J99	10B	Varangerfjorden	69° 56.0	29° 40.0	68H97	GADU MOR	LI														21	25	25	23	25	25	25	25
J99	10B	Varangerfjorden	69° 56.0	29° 40.0	68H97	GADU MOR	MU														25	30	30	27	30	30	30	30
J99	10B	Varangerfjorden	69° 56.0	29° 40.0	68H97	BROS BRO	LI														1							
J99	10B	Varangerfjorden	69° 56.0	29° 40.0	68H97	BROS BRO	MU														1							
J99	10F	Skogerøy	69° 55.0	29° 51.0	68H97	PLEU PLA	LI																	5		4	3	30
J99	10F	Skogerøy	69° 55.0	29° 51.0	68H97	PLEU PLA	MU																	5		4	3	30
J99	11A	Sildkroneset,Bøkfj	69° 47.2	30° 11.10	68J02	MYTI EDU	SB														3	3	4	3				

jmpco	jmpst	stnam	lat	lon	icear	speci	tissu	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01
J99	11X	Brashavn	69° 53.92	29° 44.65	68H97	MYTI EDU	SB																	3	3	3	3	3
J26	I001	Sponvikskansen	59° 5.40	11° 12.50	47G13	MYTI EDU	SB															3	3					
J26	I011	Kråkenebbet	59° 6.10	11° 17.30	47G13	MYTI EDU	SB															3	3					
J26	I021	Kjøkø,south	59° 7.79	10° 57.11	47G09	MYTI EDU	SB															3	3	3	3		3	3
J26	I022	West Damholmen	59° 6.20	10° 57.90	47G09	MYTI EDU	SB															3	3	3	3	3	3	3
J26	I023	Singlekalven, south	59° 5.70	11° 8.20	47G13	MYTI EDU	SB															3	3	3	3	3	3	3
J26	I024	Kirkøy, north west	59° 4.90	10° 59.20	47G09	MYTI EDU	SB															3	3	3	3	3	3	3
J26	I301	Akershuskaia	59° 54.23	10° 45.47	48G07	MYTI EDU	SB															3	3	3	3	3	3	3
J26	I304	Gåsøya	59° 51.11	10° 35.51	48G04	MYTI EDU	SB															3	3	3	3	3	3	3
J26	I306	Håøya	59° 42.69	10° 33.35	48G05	MYTI EDU	SB															3	3	3	3	3	3	3
J26	I307	Ramtonholmen	59° 44.70	10° 31.40	48G05	MYTI EDU	SB															3	3	3	3	3	3	3
J99	I711	Steinholmen	59° 3.15	9° 40.70	47F99	MYTI EDU	SB															3	4	3	3	3	3	
J99	I712	Gjemesholmen	59° 2.75	9° 42.47	47F99	MYTI EDU	SB															3	4	3	3	3	3	3
J99	I131	Lastad	58° 3.30	7° 42.40	45F79	MYTI EDU	SB															3	3	3	3	3	3	3
J99	I132	Fiskåtangen	58° 7.75	7° 58.60	45F79	MYTI EDU	SB															4	4	3	3	3	3	3
J99	I133	Odderø,west	58° 7.90	8° 0.15	45F83	MYTI EDU	SB															4	4	3	3	3	3	3
J99	I201	Ekkjegrunn (G1)	59° 38.65	6° 21.38	48F66	MYTI EDU	SB															3	3	3	3	3	3	3
J99	I205	Bølsnes (G5)	59° 35.50	6° 18.30	48F63	MYTI EDU	SB															3		3	3	3	3	3
J99	I241	Nordnes	60° 24.10	5° 18.20	49F51	MYTI EDU	SB															3	3	3	3	3	3	3
J99	I242	Valheimneset	60° 23.70	5° 16.10	49F51	MYTI EDU	SB															3	3	3	3	3	3	3
J99	I243	Hegreneset	60° 24.90	5° 18.50	49F51	MYTI EDU	SB															3	3	3	3	3	3	3
J99	I911	Horvika	62° 44.10	8° 31.40	54F85	MYTI EDU	SB															3	3					
J99	I913	Fjøseid	62° 48.59	8° 16.48	54F82	MYTI EDU	SB																			3	3	3
J99	I912	Honnhammer	62° 51.20	8° 9.70	54F81	MYTI EDU	SB															3	3	3	3	3	3	3
J65	I080	Østmerknes	63° 27.50	10° 27.50	55G04	MYTI EDU	SB															3	3					
J99	I962	Koksverktomta (B2)	66° 19.57	14° 8.38	61G42	MYTI EDU	SB															3	3	2	3			
J99	I965	Moholmen (B5)	66° 18.72	14° 7.62	61G42	MYTI EDU	SB																					3
J99	I969	Bjørnbærviken (B9)	66° 16.79	14° 2.13	61G42	MYTI EDU	SB															3	3	3	3	3	3	3
J99	R096	Breiviken, Tomma	66° 17.60	12° 50.50	61G28	MYTI EDU	SB															3	3					
J26	A3*	Svartskjær	58° 58.90	9° 49.90	46F97	MYTI EDU	SB	1																				

Appendix F
Map of stations

Station positions 1981-2001
(cf. Appendix G and Appendix J)

Appendix F (cont.) Map of stations

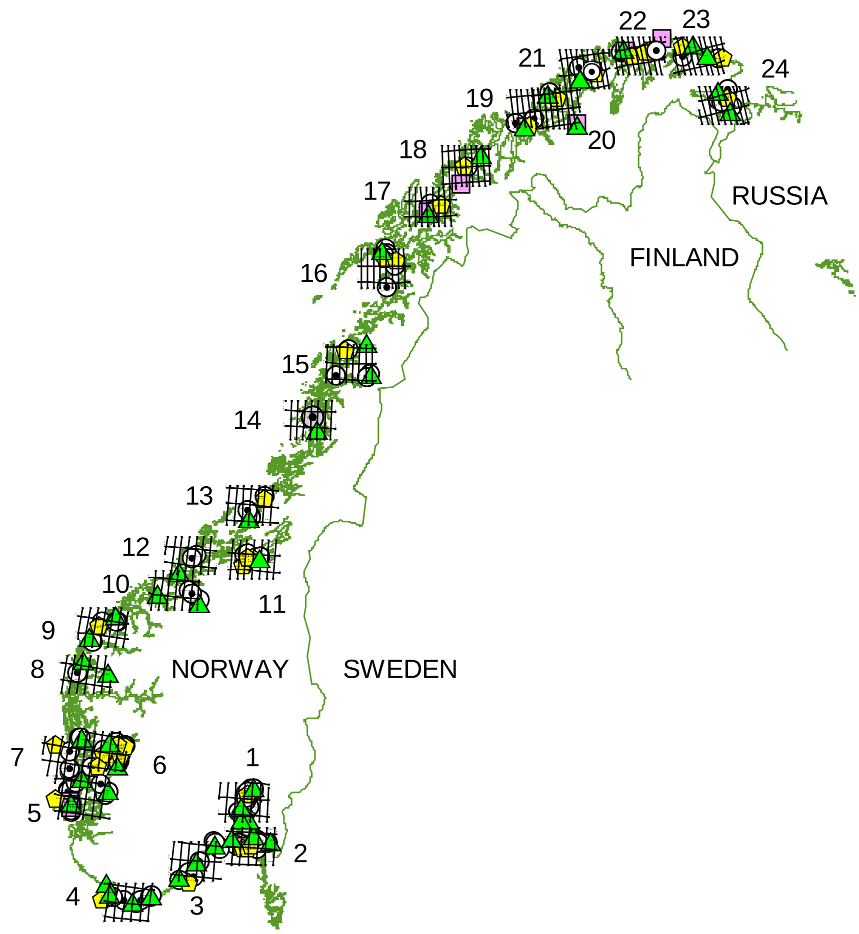
NOTES

For a few stations the geolocation has varied somewhat in order to collect sufficient material (e.g., st. 36B and 98A) or investigate local geographical variations (e.g., in the inner Oslofjord and Sørfjord). Hence, the same station name may appear more than once on a map.

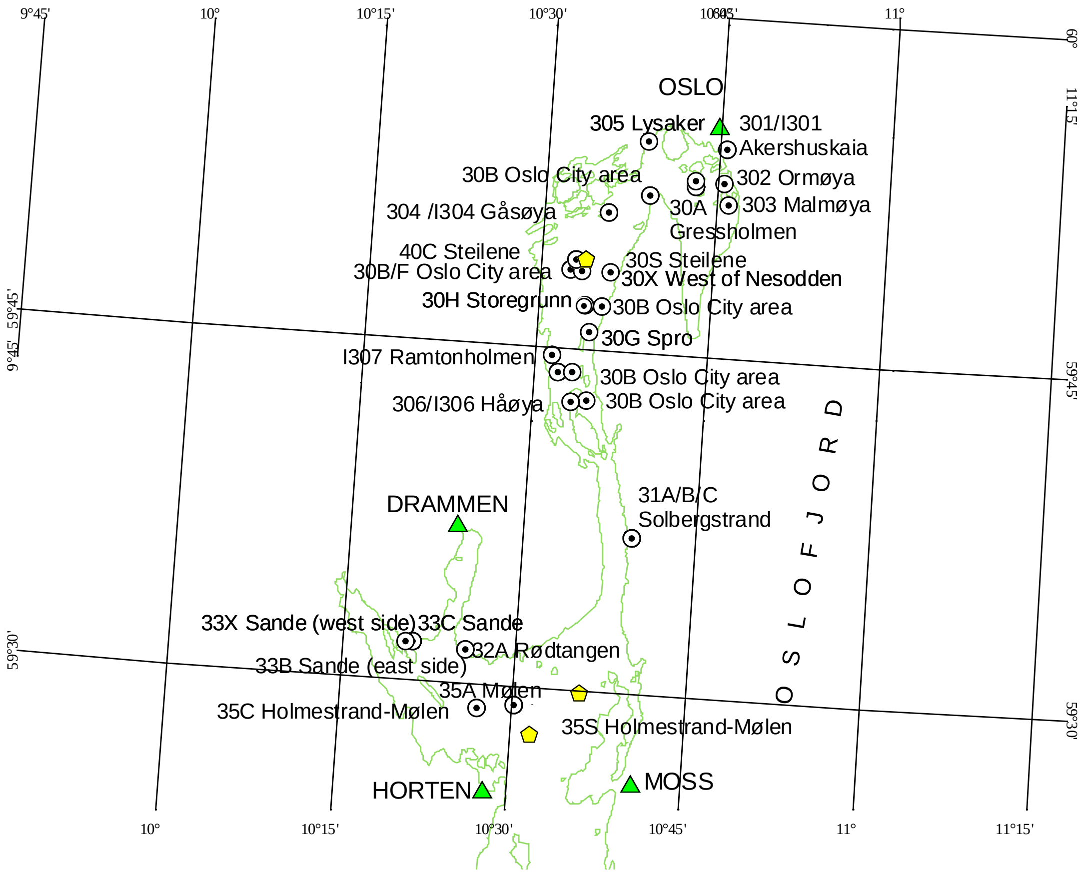
The letter A following the station identification number indicates that blue mussels were sampled. The letter B indicates sampling for cod and the letter F indicates sampling for flatfish. This system for fish is not consistent for some older stations (30, 33, 52 and 67) where only the letter B is used indicating that either cod or flatfish or both were sampled. An encircled dot indicates a mussel, shrimp or fish station. The letter G indicates sampling for dog whelks and S indicates sampling for sediment. An encircled dot indicates the position for sampling mussels, shrimp or fish. A square and pentagon symbol indicates the position for sampling dog whelks or sediment, respectively. A triangle indicates the position of a town or city.

The letter "I" preceding the station identification number indicates an INDEX station for determining a "pollution" index. The letter R indicates a station for evaluating a "reference" index. Only blue mussels are used for these indices. The indices are based on a selection of JAMP and INDEX stations (cf. Green *et al.* 2001).

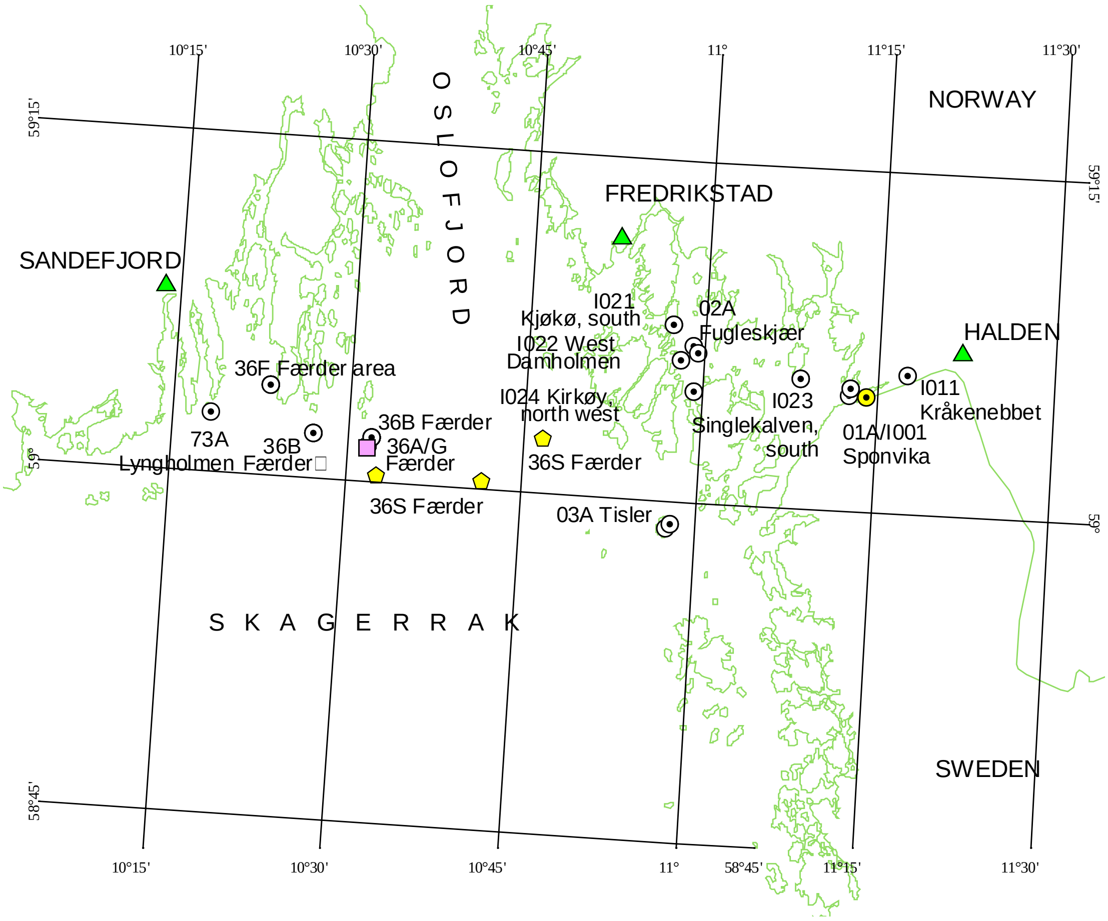
The maps are generated using ArcView GIS version 3.3.



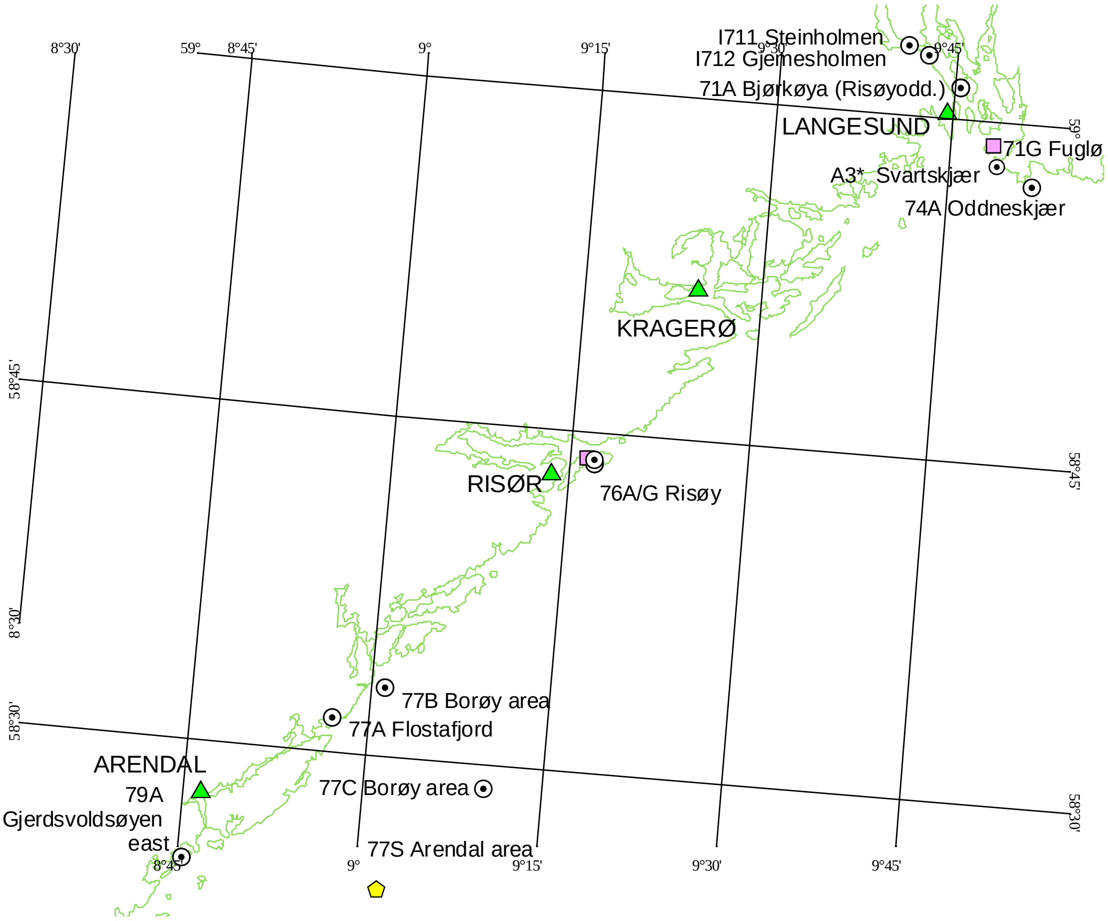
JAMP stations Norway. Numbers indicate map reference


OSLO
305 Lysaker
301/I301
Akershuskaia
30B Oslo City area
302 Ormøya
304 /I304 Gåsøya
30A
Gressholmen
303 Malmøya
40C Steilene
30B/F Oslo City area
30S Steilene
30X West of Nesodden
30H Storegrunn
30B Oslo City area
30G Spro
I307 Ramtonholmen
30B Oslo City area
306/I306 Håøya
30B Oslo City area
DRAMMEN
31A/B/C
Solbergstrand
O S L O F J O R D
33X Sande (west side)
33C Sande
32A Rødtangen
33B Sande (east side)
35A Mølen
35C Holmestrand-Mølen
35S Holmestrand-Mølen
HORTEN
MOSS

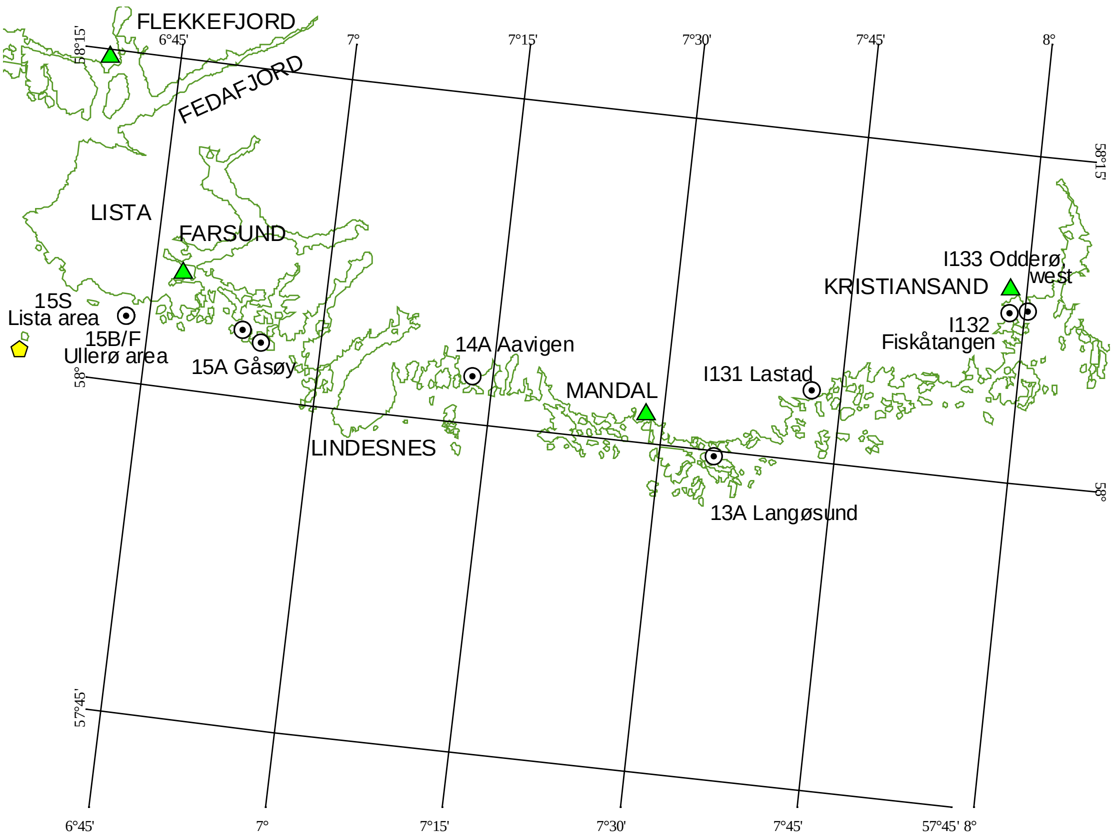
MAP 1


NORWAY
O S L O F J O R D
FREDRIKSTAD
SANDEFJORD
I021
Kjøkø, south
02A
Fugleskjær
I022 West
Damholmen
HALDEN
36F Færder area
I024 Kirkøy,
north west
I023
Singlekalven,
south
I011
Kråkenebbet
36B Færder
73A
Lyngholmen
36B
Færder
36A/G
Færder
36S Færder
01A/I001
Sponvika
36S Færder
03A Tisler
S K A G E R R A K
SWEDEN

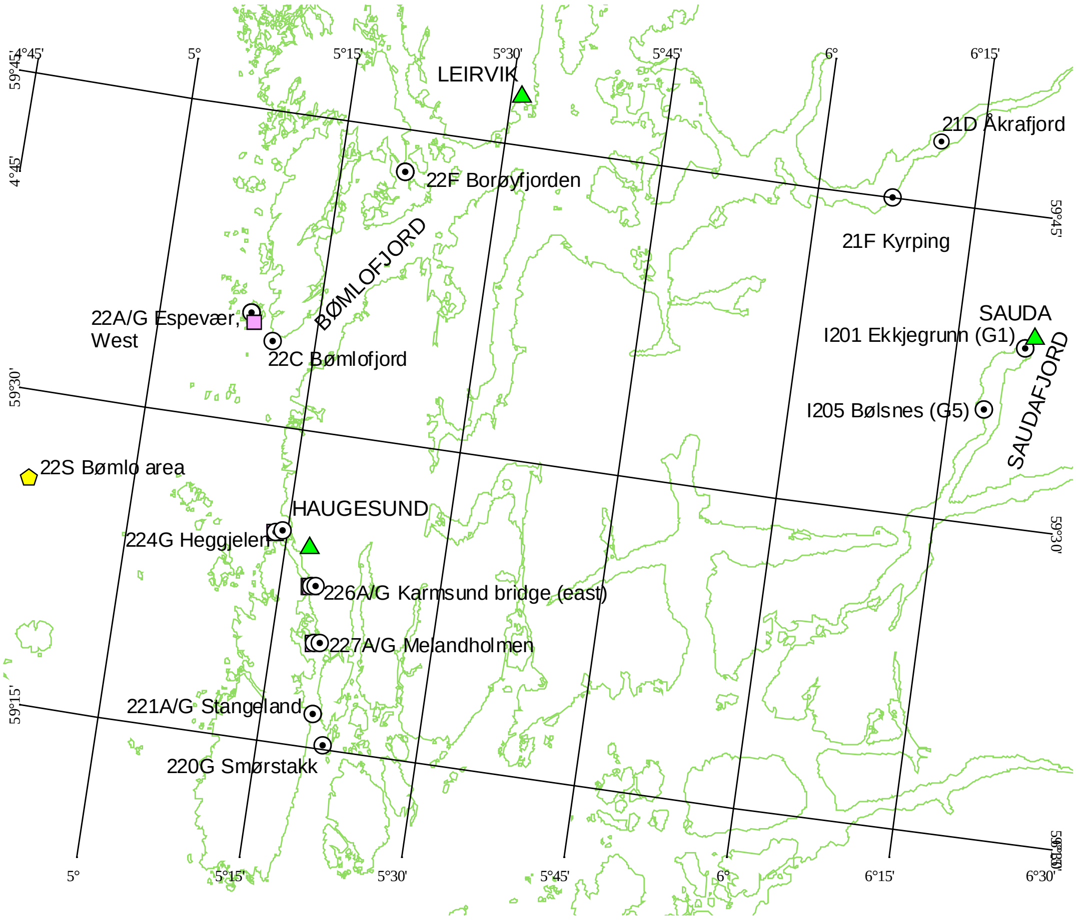
MAP 2


I711 Steinholmen
I712 Gjernesholmen
71A Bjørkøya (Risøyodd.)
LANGESUND
71G Fuglø
A3* Svartskjær
74A Oddneskjær
KRAGERØ
RISØR
76A/G Risøy
77B Borøy area
77A Flostafjord
ARENDAL
79A
Gjerdsvoldsøyen
east
77C Borøy area
77S Arendal area
8°30'
59°
8°45'
9°
9°15'
9°30'
9°45'
58°45'
58°30'

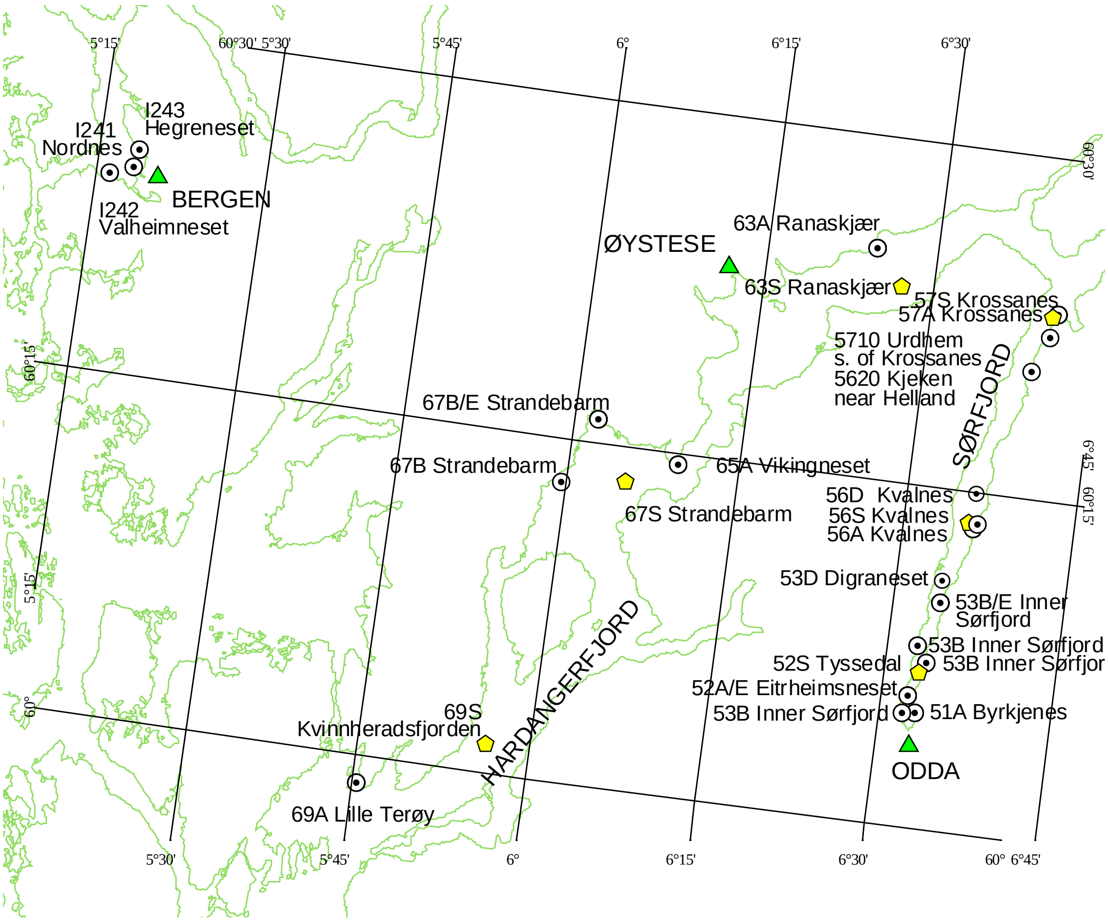
MAP 3


FLEKKEFJORD
FEDAFJORD
LISTA
FARSUND
15S
Lista area
15B/F
Ullerø area
15A Gåsøy
LINDESNES
14A Aavigen
MANDAL
I131 Lastad
13A Langøsund
KRISTIANSAND
I133 Odderø,
west
I132
Fiskåtangen
6°45'
7°
7°15'
7°30'
7°45'
8°
58°15'
58°
57°45'

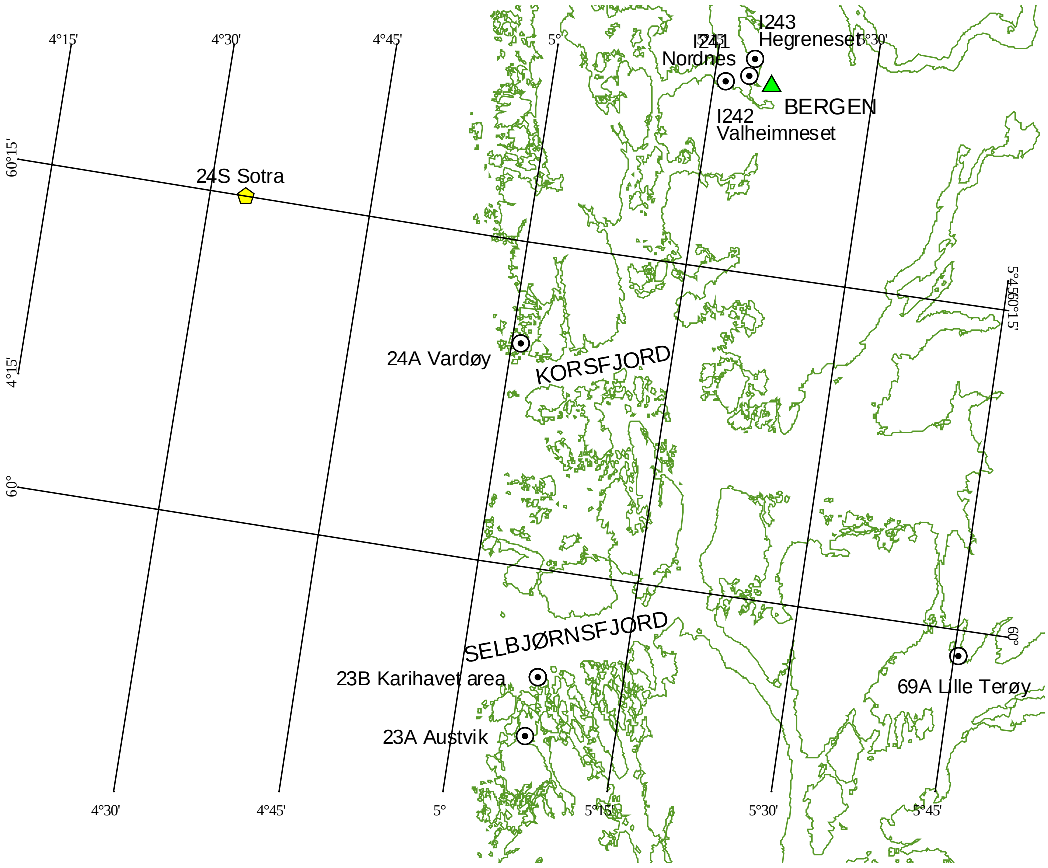
MAP 4


LEIRVIK
21D Åkrafjord
22F Borøyfjorden
21F Kyrping
BØMLOFJORD
22A/G Espevær,
West
22C Bømlofjord
SAUDA
I201 Ekkjegrunn (G1)
SAUDAFJORD
I205 Bølsnes (G5)
22S Bømlo area
HAUGESUND
224G Heggjelen
226A/G Karmsund bridge (east)
227A/G Melandholmen
221A/G Stangeland
220G Smørstakk

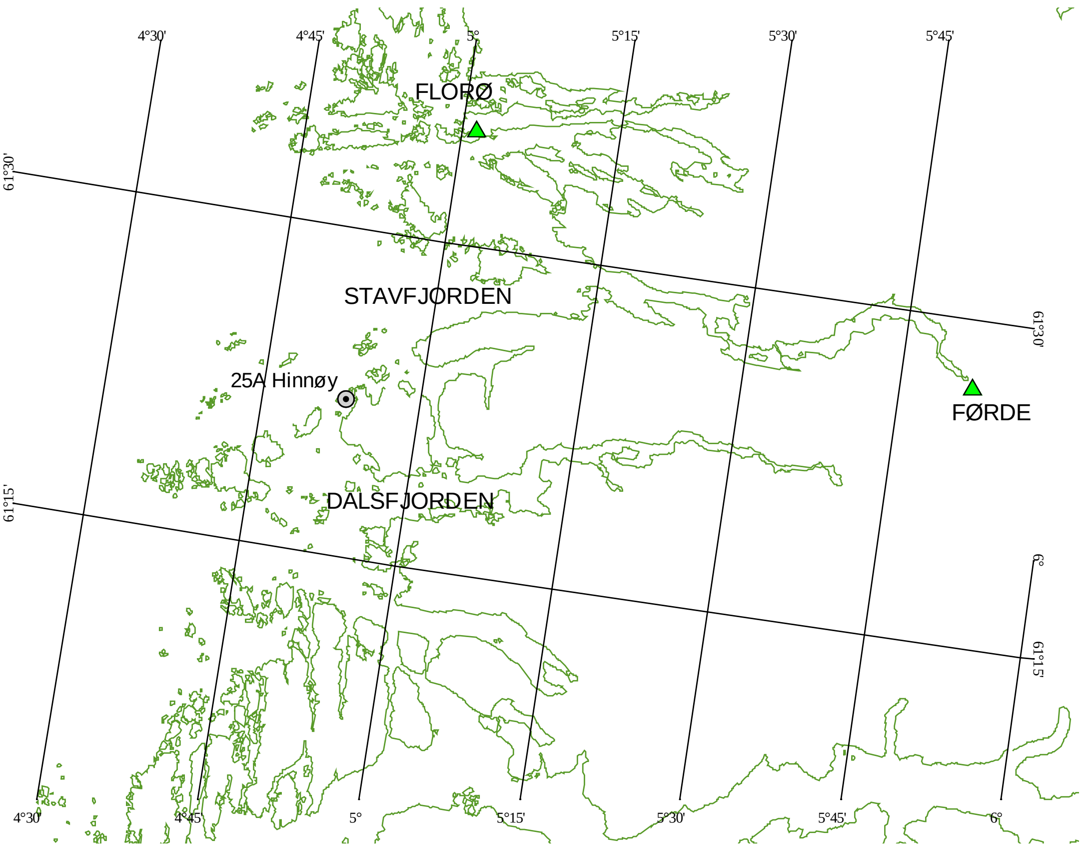
MAP 5


I243
Hegreneset
I241
Nordnes
BERGEN
I242
Valheimneset
63A Ranaskjær
ØYSTESE
63S Ranaskjær
57S Krossanes
57A Krossanes
5710 Urdhem
s. of Krossanes
5620 Kjeken
near Helland
SØRFJORD
67B/E Strandebarm
67B Strandebarm
65A Vikingneset
67S Strandebarm
56D Kvalnes
56S Kvalnes
56A Kvalnes
53D Digraneset
53B/E Inner
Sørfjord
53B Inner Sørfjord
52S Tyssedal
53B Inner Sørfjor
52A/E Eitrheimsneset
53B Inner Sørfjord
51A Byrkjenes
69S
Kvinnheradsfjorden
HARDANGERFJORD
ODDA
69A Lille Terøy

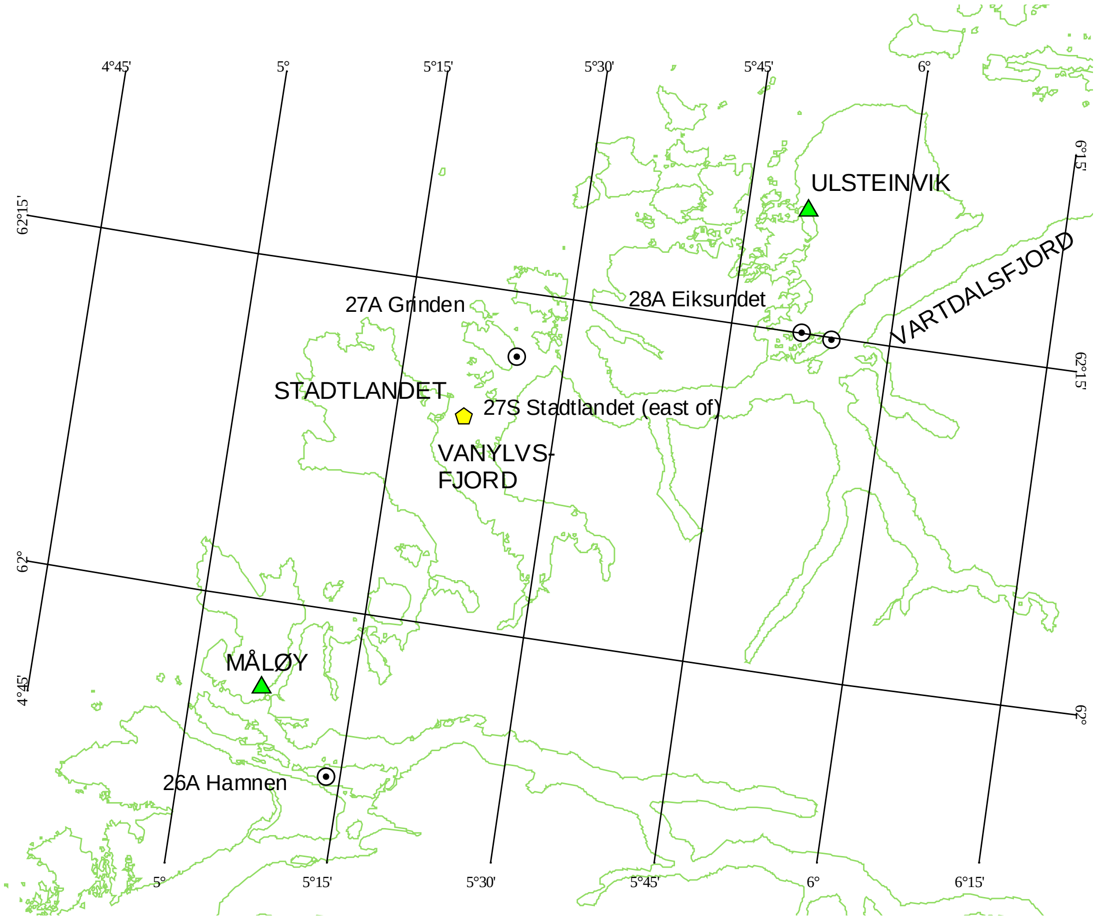
MAP 6


I243
Hegreneset
I241
Nordnes
BERGEN
I242
Valheimneset
24S Sotra
24A Vardøy
KORSFJORD
SELBJØRNSFJORD
23B Karihavet area
23A Austvik
69A Lille Terøy
4°15'
4°30'
4°45'
5°
5°15'
5°30'
5°45'
60°15'
60°

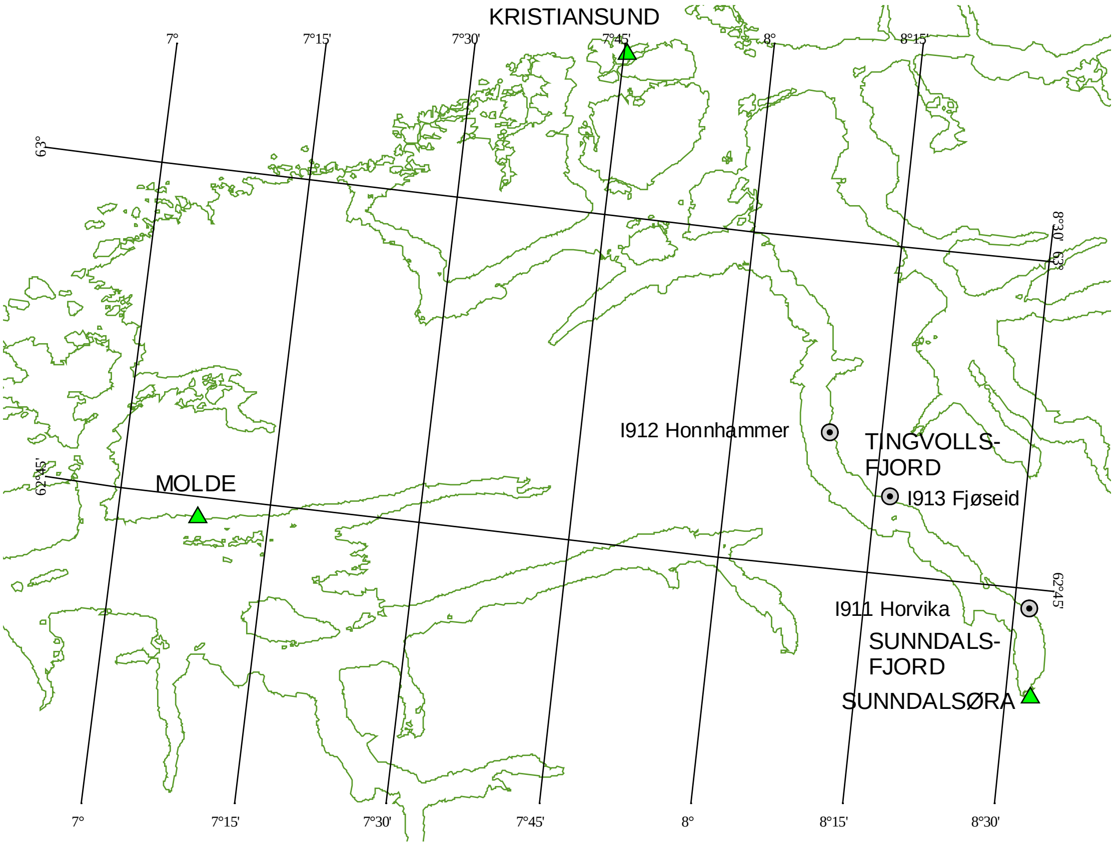
MAP 7


FLORØ
STAVFJORDEN
25A Hinnøy
DALSFJORDEN
FØRDE
4°30'
4°45'
5°
5°15'
5°30'
5°45'
6°
61°30'
61°15'

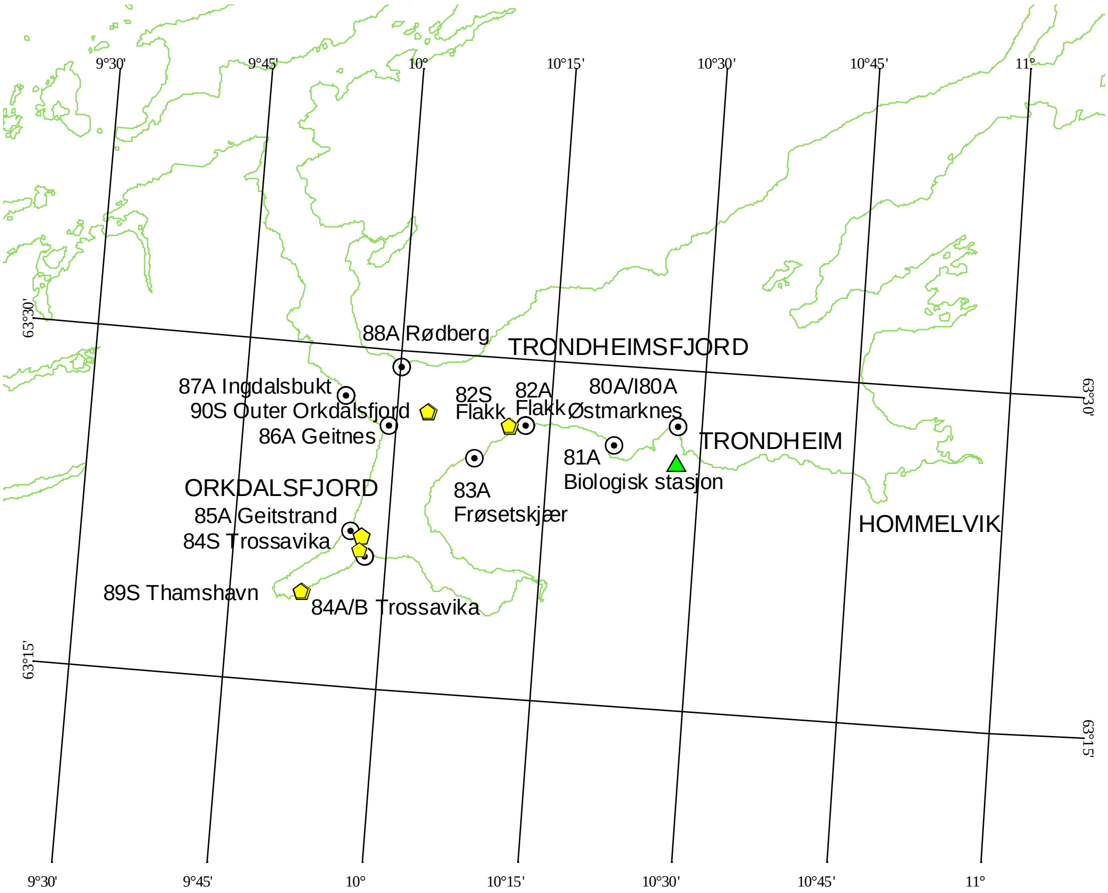
MAP 8


4°45'
5°
5°15'
5°30'
5°45'
6°
6°15'
62°15'
62°
ULSTEINVIK
VARTDALSFJORD
27A Grinden
28A Eiksundet
STADTLANDET
27S Stadtlandet (east of)
VANYLVS-
FJORD
MÅLØY
26A Hamnen
5°
5°15'
5°30'
5°45'
6°
6°15'

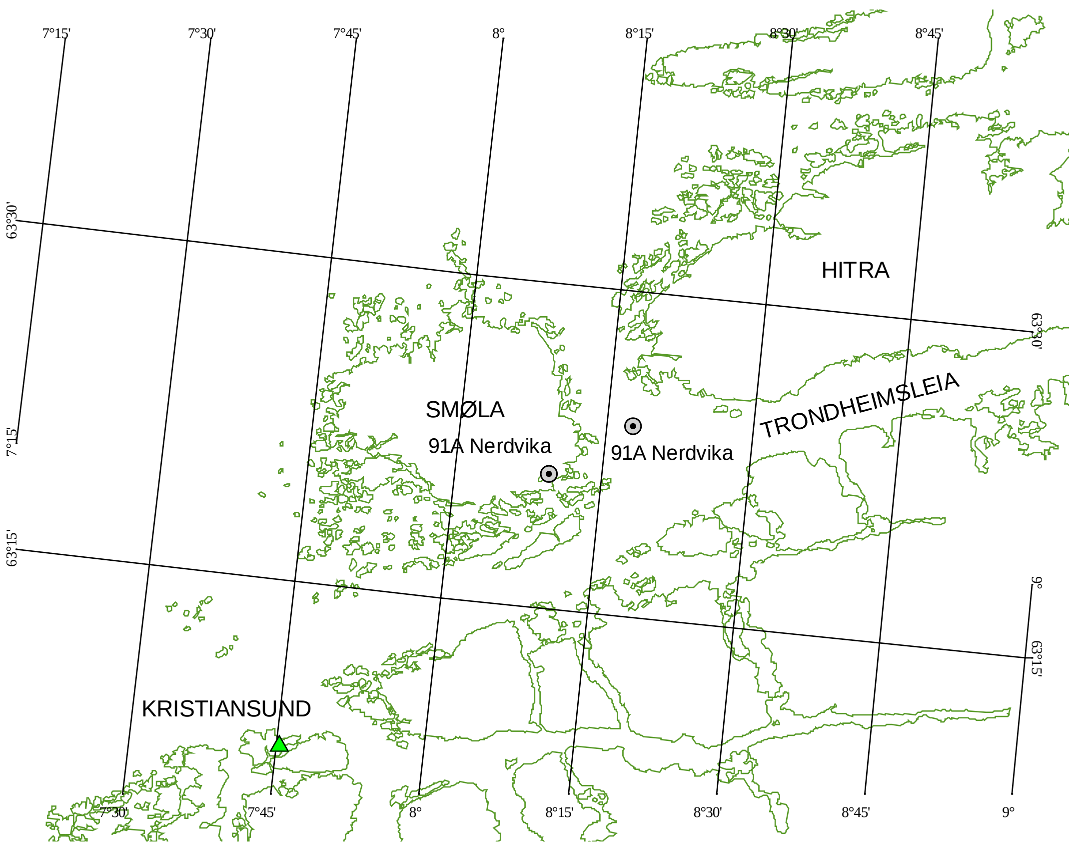
MAP 9


KRISTIANSUND
7°
7°15'
7°30'
7°45'
8°
8°15'
8°30'
63°
62°45'
I912 Honnhammer
TINGVOLLS-
FJORD
I913 Fjøseid
MOLDE
I911 Horvika
SUNNDALS-
FJORD
SUNNDALSØRA
7°
7°15'
7°30'
7°45'
8°
8°15'
8°30'

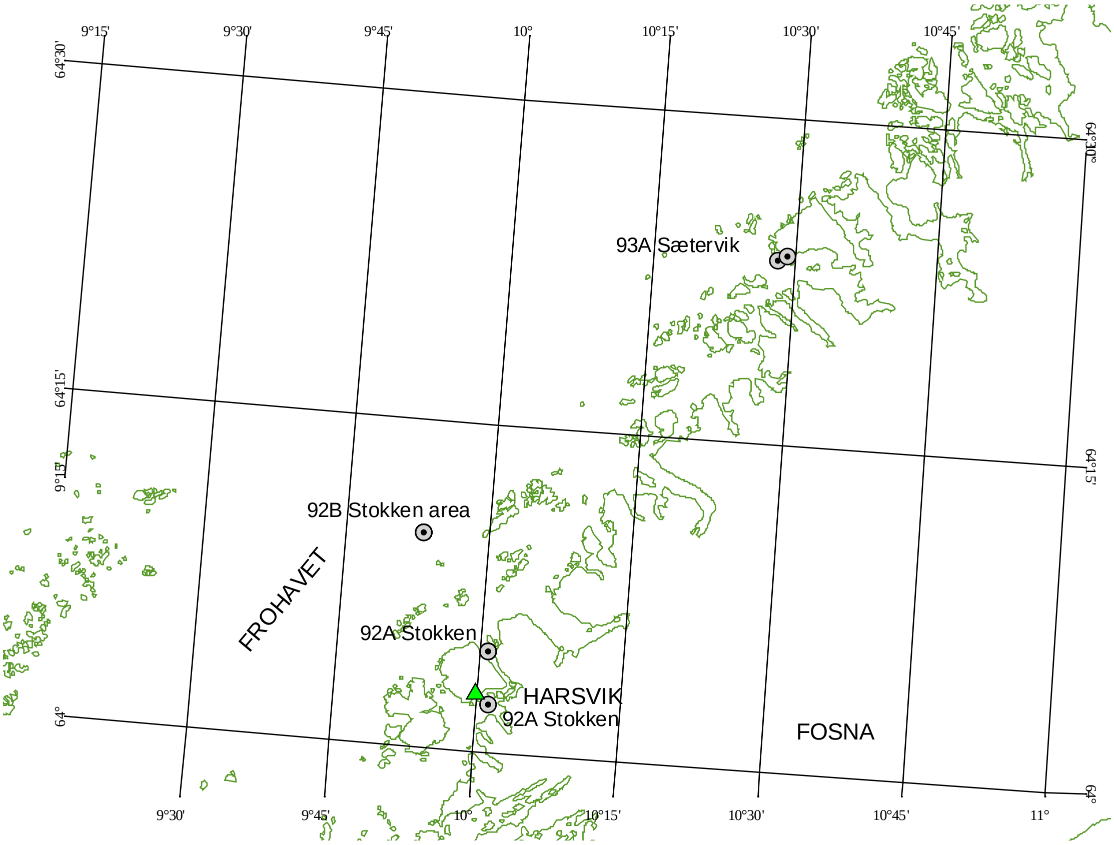
MAP 10


88A Rødberg
TRONDHEIMSFJORD
87A Ingdalsbukt
90S Outer Orkdalsfjord
86A Geitnes
82S
Flakk
82A
Flakk
80A/I80A
Østmarknes
TRONDHEIM
81A
Biologisk stasjon
83A
Frøsetskjær
ORKDALSFJORD
85A Geitstrand
84S Trossavika
89S Thamshavn
84A/B Trossavika
HOMMELVIK
9°30'
9°45'
10°
10°15'
10°30'
10°45'
11°
63°30'
63°15'

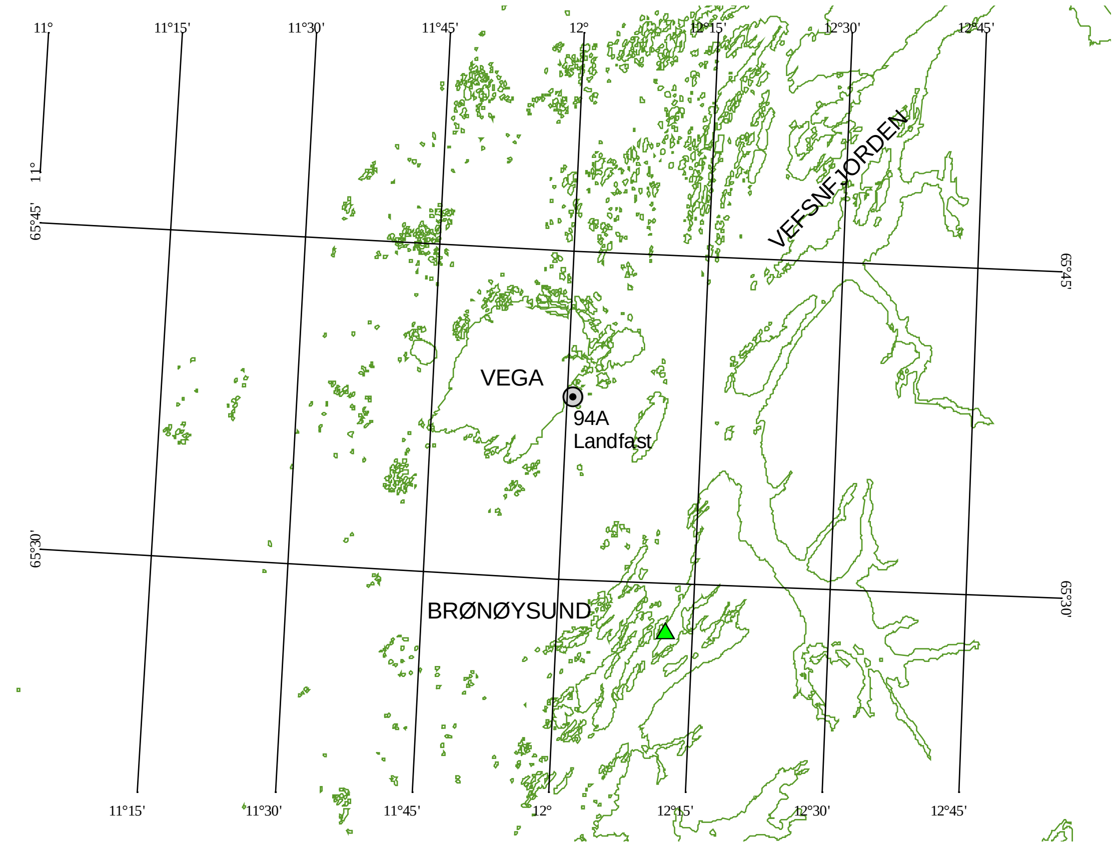
MAP 11


HITRA
SMØLA
91A Nerdvika
91A Nerdvika
TRONDHEIMSLEIA
KRISTIANSUND
7°15'
7°30'
7°45'
8°
8°15'
8°30'
8°45'
9°
63°30'
63°15'

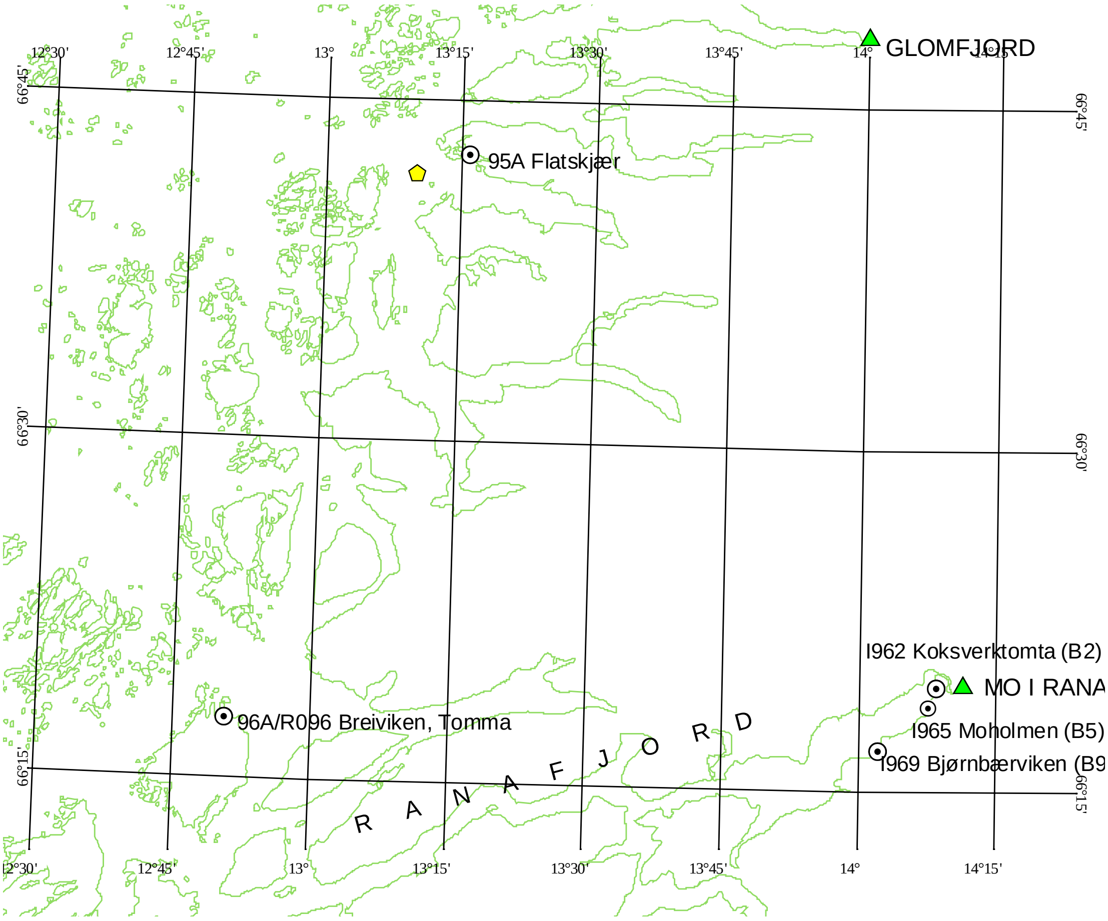
MAP 12


93A Sætervik
92B Stokken area
FROHAVET
92A Stokken
HARSVIK
92A Stokken
FOSNA

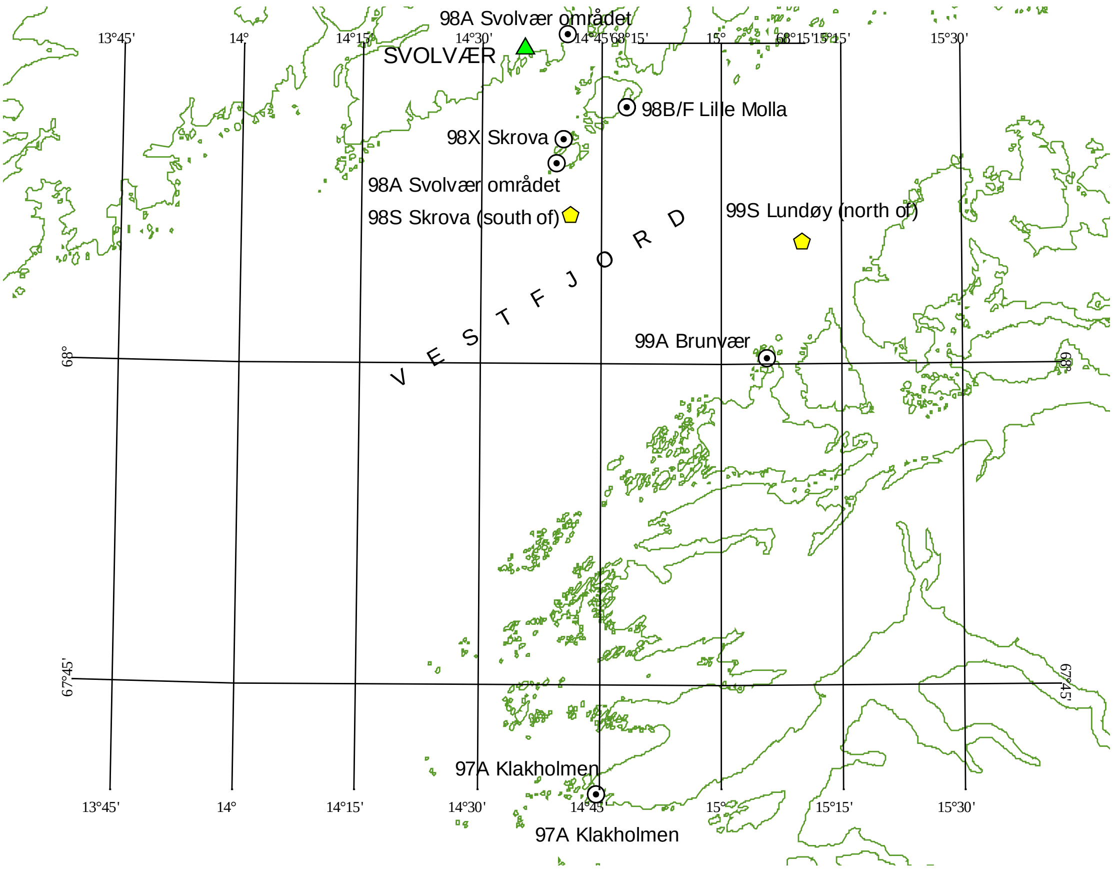
MAP 13


VEFSNFJORDEN
VEGA
94A
Landfast
BRØNØYSUND

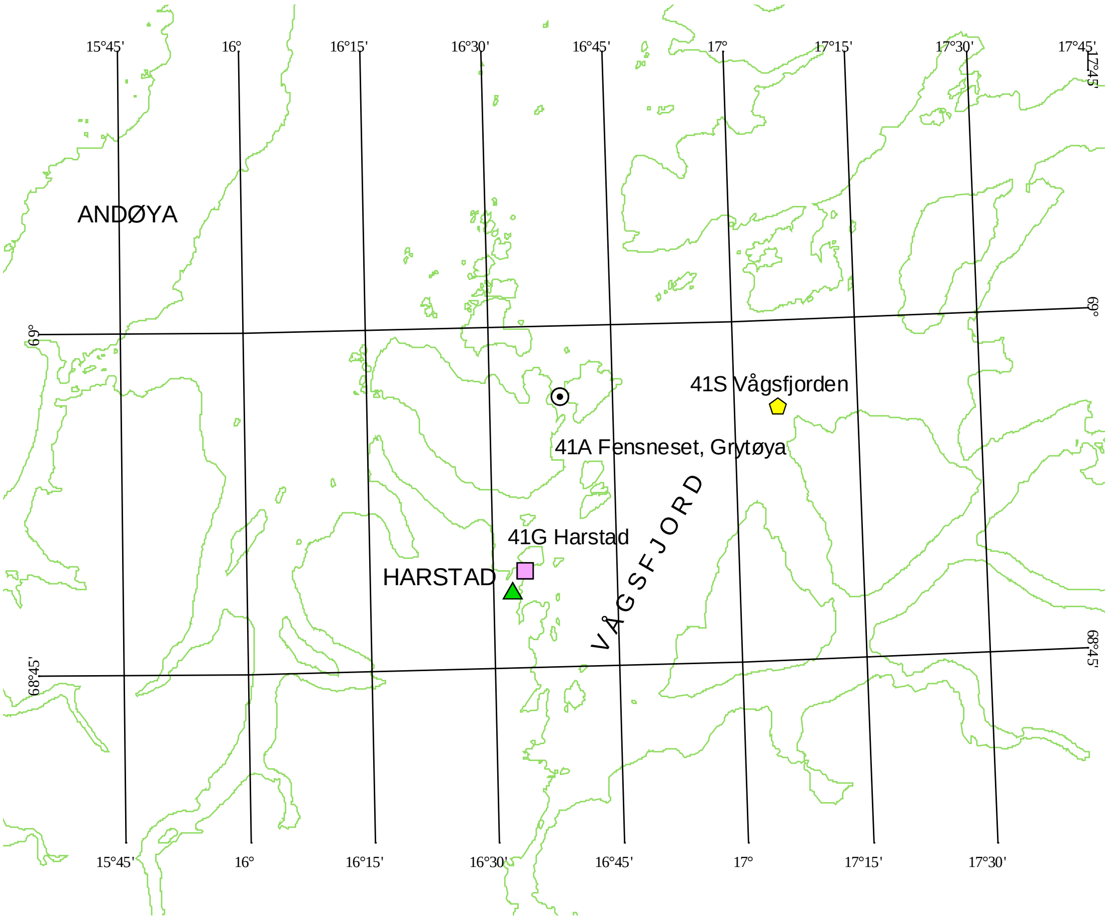
MAP 14


12°30'
12°45'
13°
13°15'
13°30'
13°45'
14°
14°15'
GLOMFJORD
66°45'
95A Flatskjær
66°30'
I962 Koksverktomta (B2)
MO I RANA
I965 Moholmen (B5)
I969 Bjørnbærviken (B9
96A/R096 Breiviken, Tomma
R A N A F J O R D
66°15'

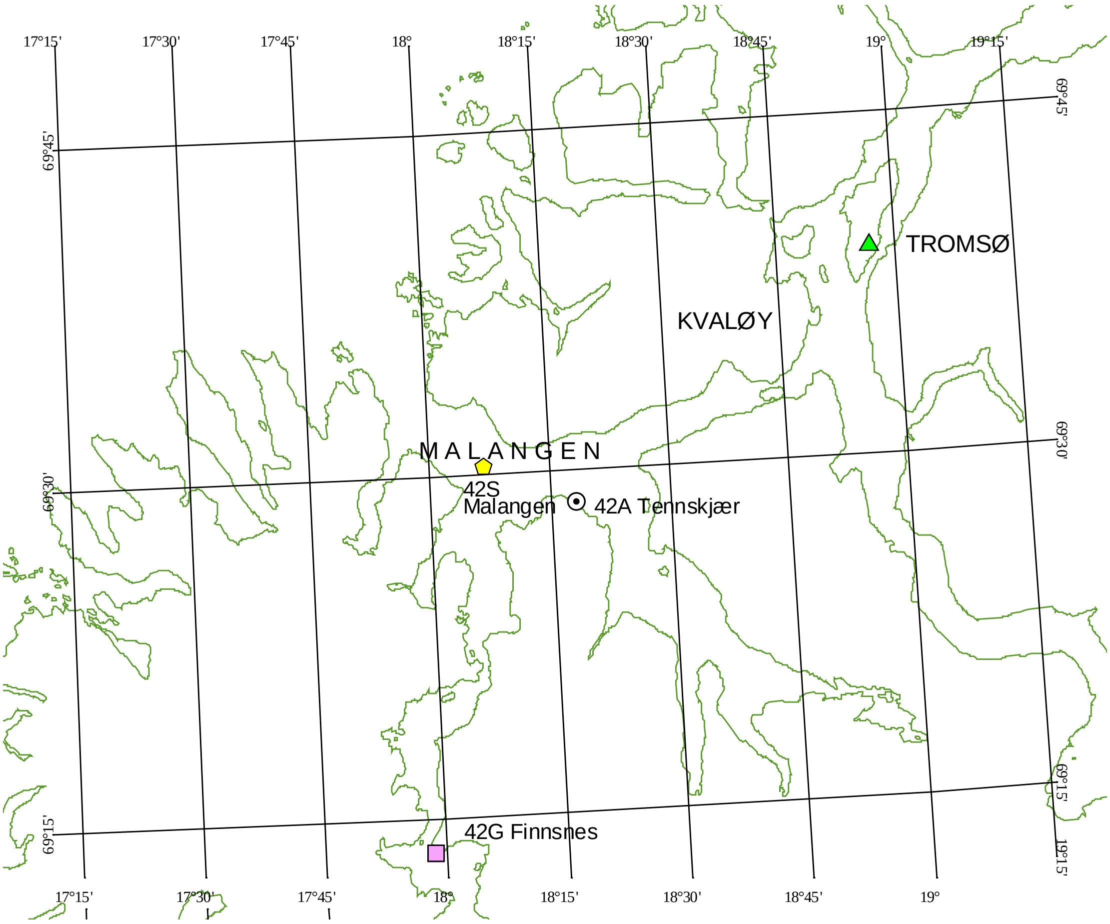
MAP 15


98A Svolvær området
SVOLVÆR
13°45'
14°
14°15'
14°30'
14°45'
15°
15°15'
15°30'
98B/F Lille Molla
98X Skrova
98A Svolvær området
98S Skrova (south of)
99S Lundøy (north of)
V E S T F J O R D
99A Brunvær
68°
67°45'
97A Klakholmen
97A Klakholmen

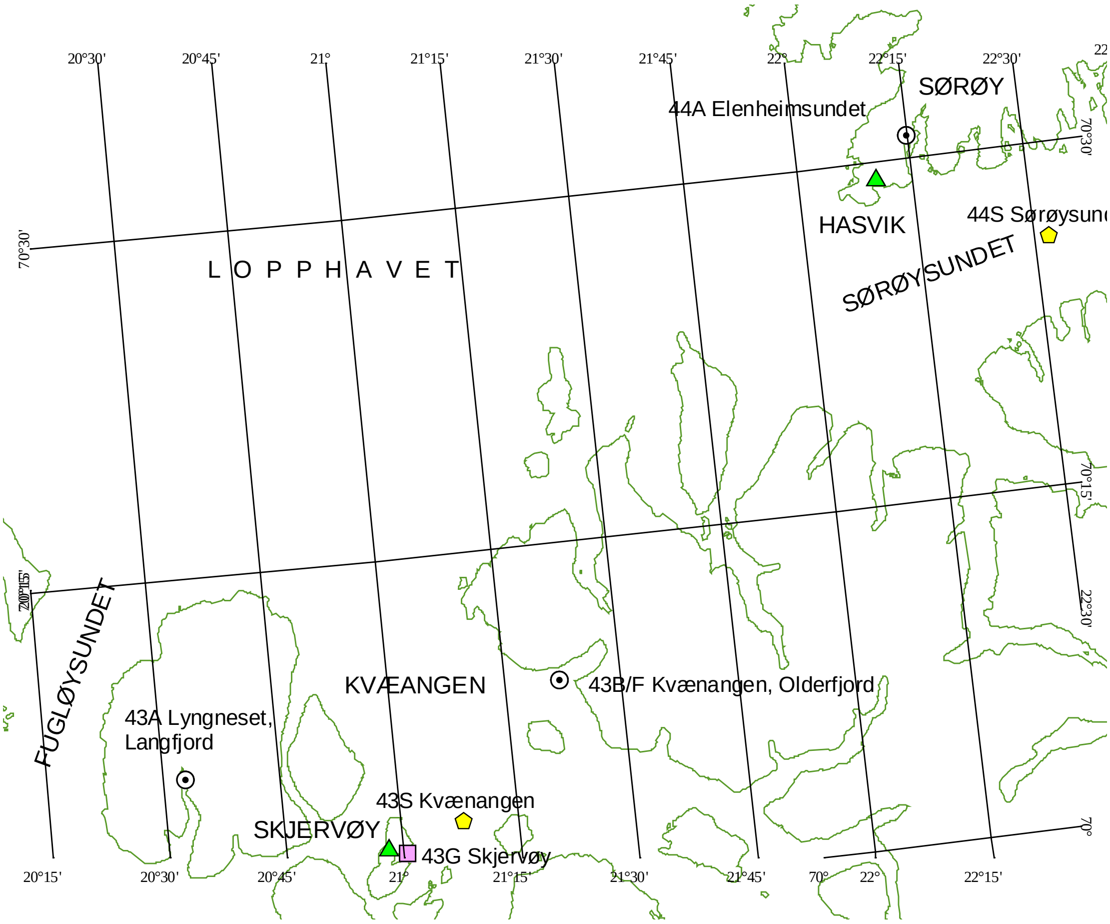
MAP 16


15°45'
16°
16°15'
16°30'
16°45'
17°
17°15'
17°30'
17°45'
ANDØYA
69°
41S Vågsfjorden
41A Fensneset, Grytøya
41G Harstad
HARSTAD
VÅGSFJORD
68°45'

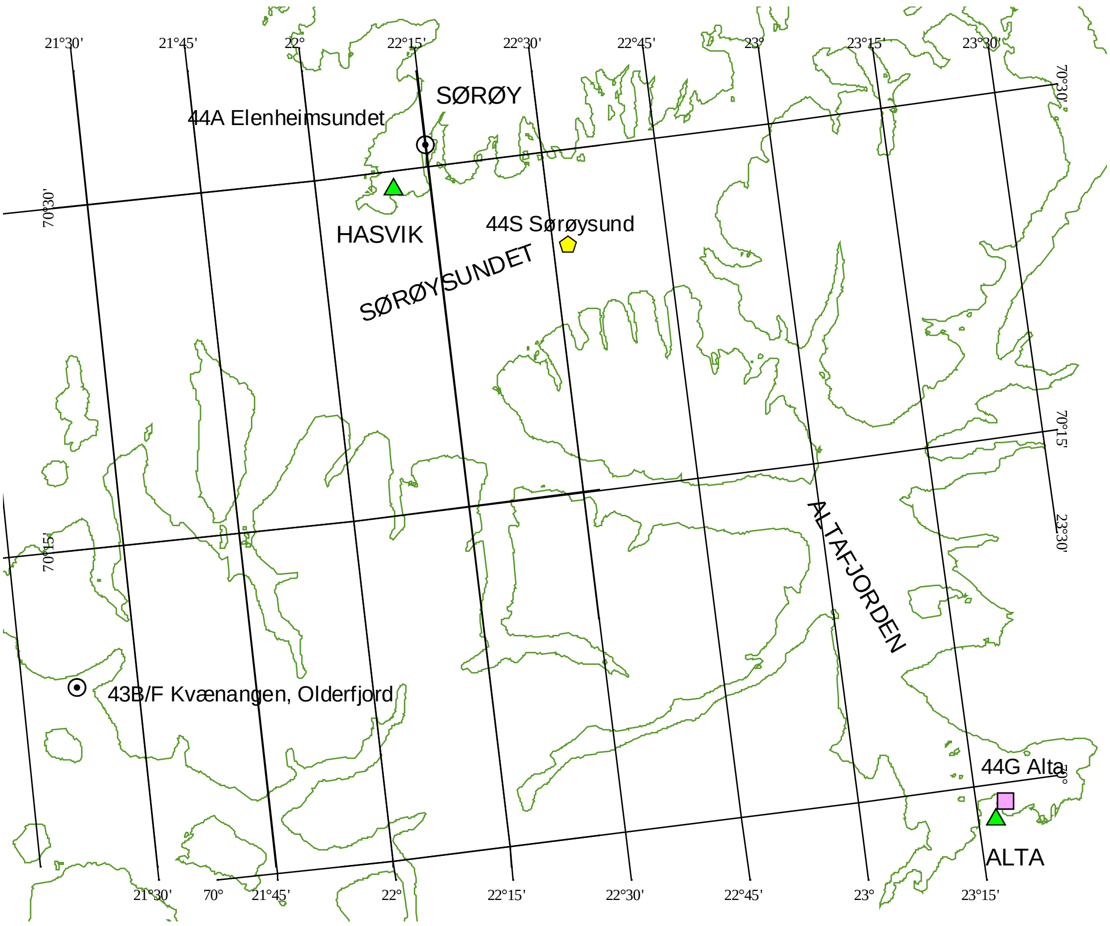
MAP 17


17°15'
17°30'
17°45'
18°
18°15'
18°30'
18°45'
19°
19°15'
69°45'
TROMSØ
KVALØY
MALANGEN
69°30'
42S
Malangen
42A Tennskjær
42G Finnsnes
69°15'

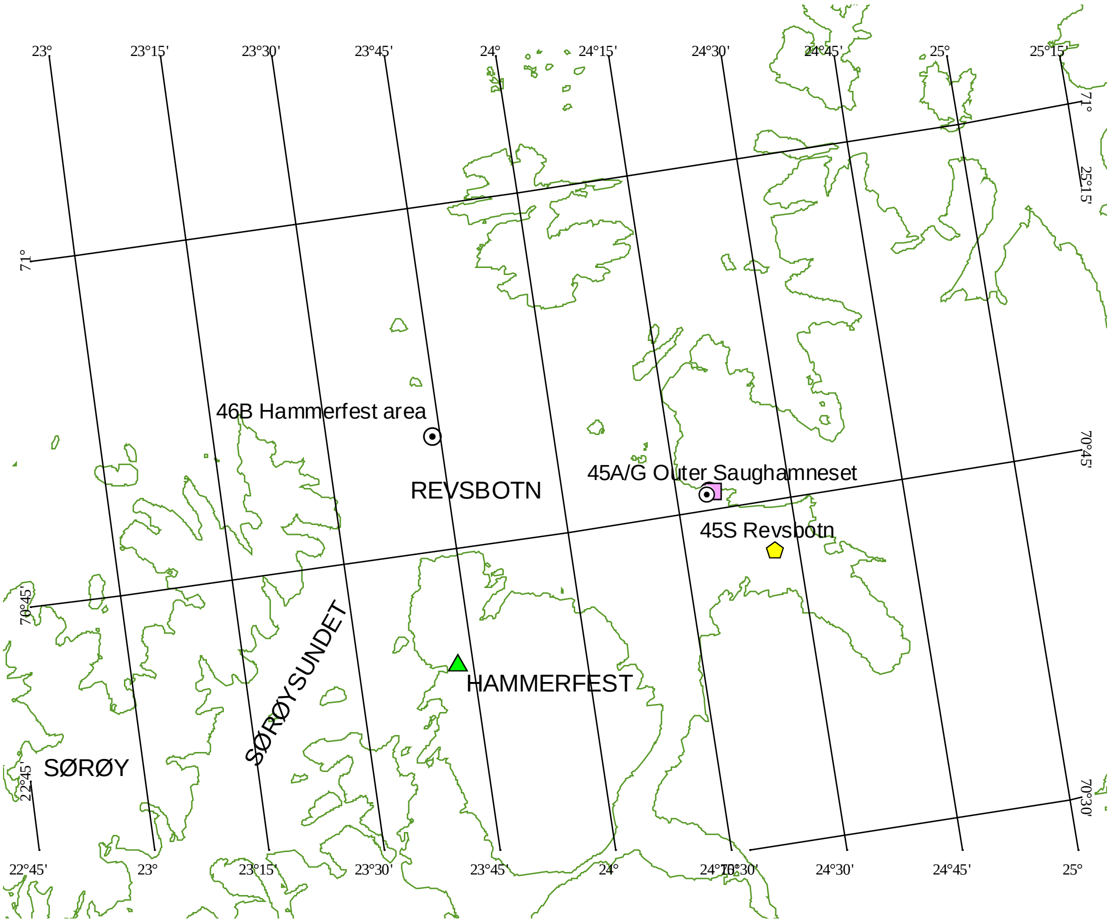
MAP 18


SØRØY
44A Elenheimsundet
HASVIK
44S Sørøysund
SØRØYSUNDET
L O P P H A V E T
FUGLØYSUNDET
KVÆANGEN
43B/F Kvænangen, Olderfjord
43A Lyngneset,
Langfjord
43S Kvænangen
SKJERVØY
43G Skjervøy

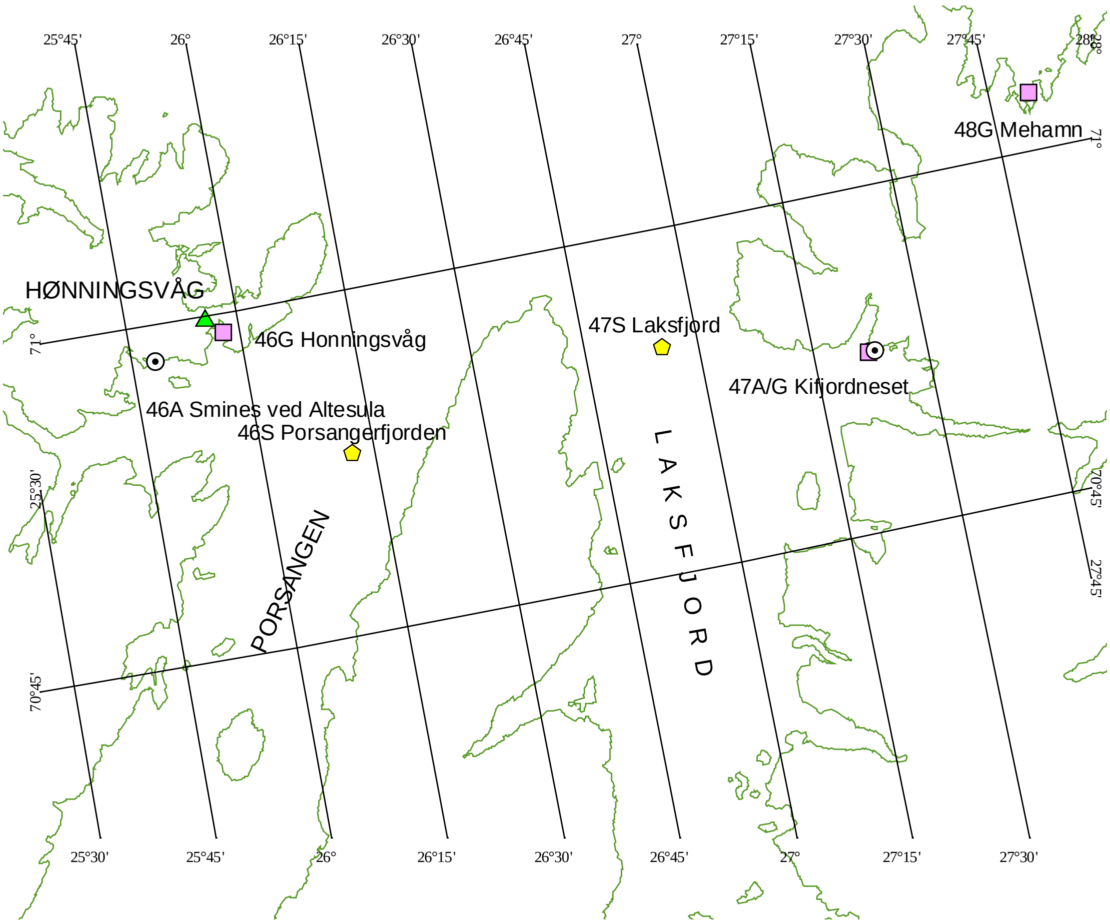
MAP 19


SØRØY
44A Elenheimsundet
HASVIK
44S Sørøysund
SØRØYSUNDET
ALTAFJORDEN
43B/F Kvænangen, Olderfjord
44G Alta
ALTA

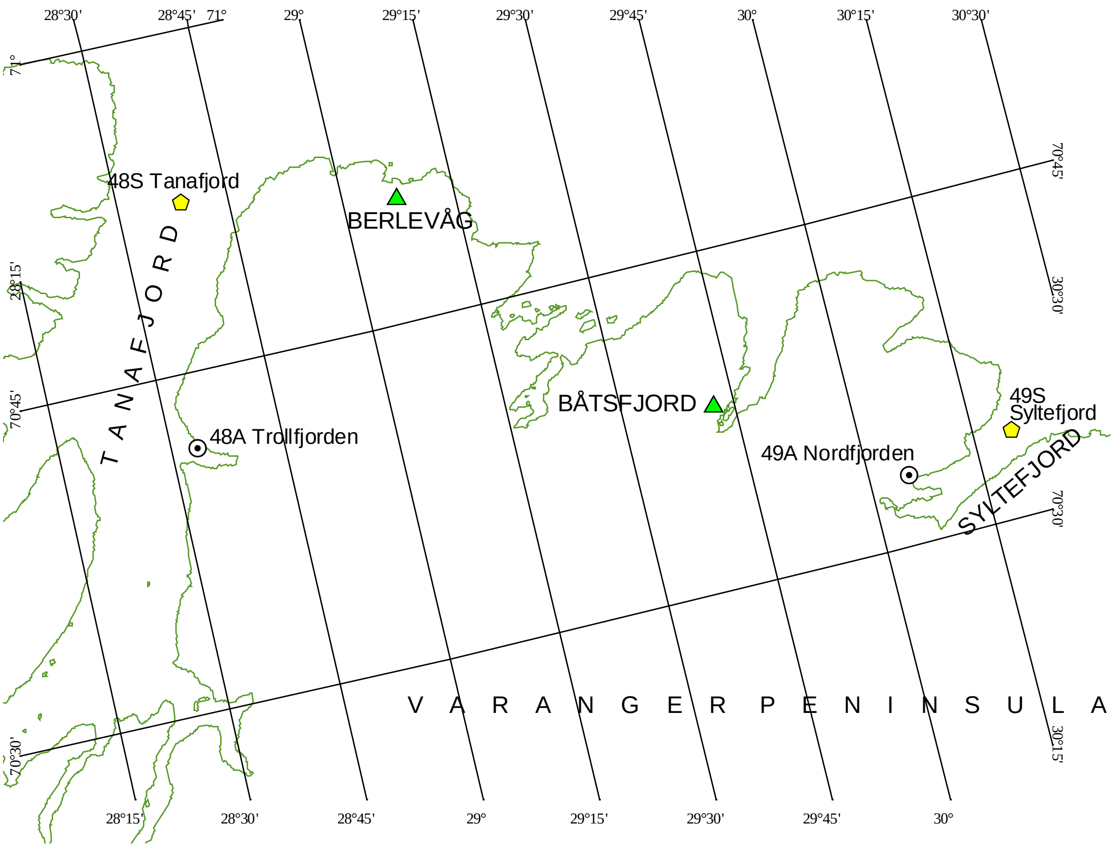
MAP 20


46B Hammerfest area
REVSBOTN
45A/G Outer Saughamneset
45S Revsbotn
HAMMERFEST
SØRØYSUNDET
SØRØY

MAP 21

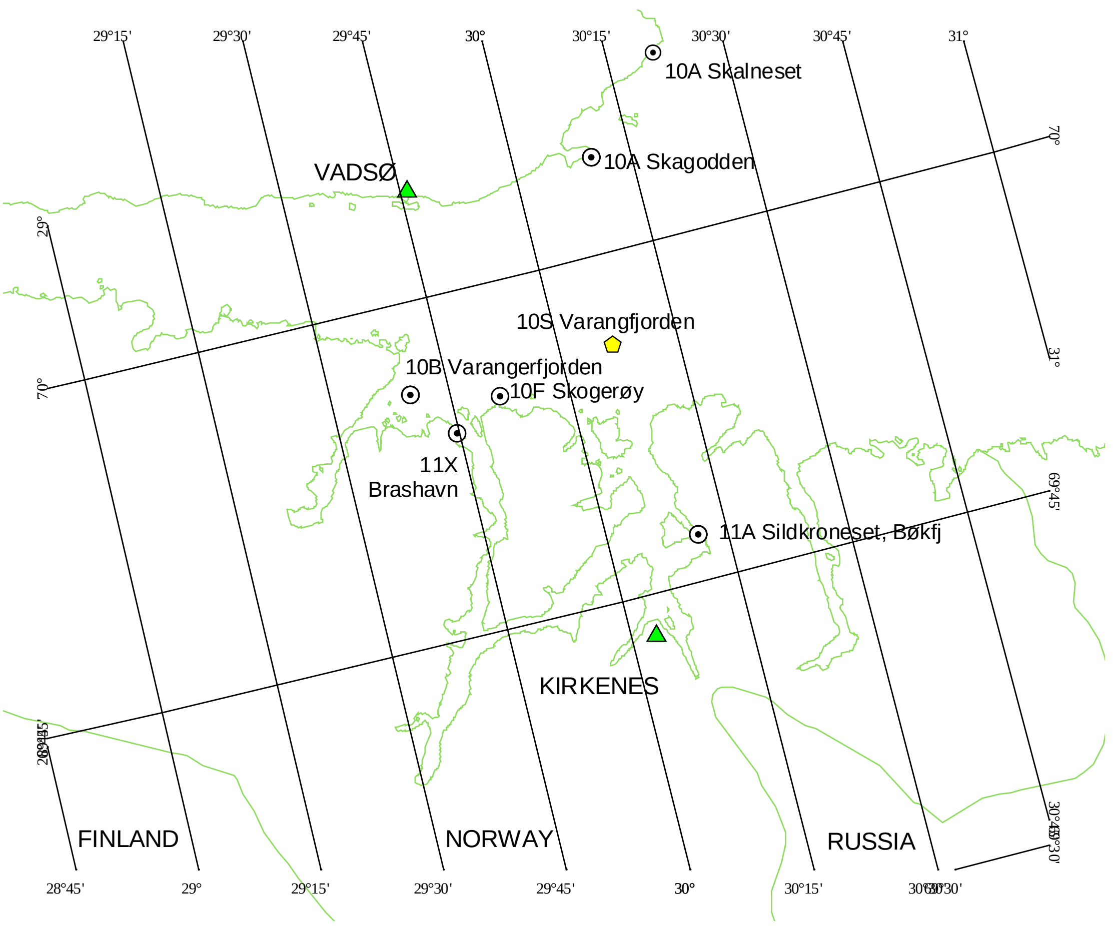

48G Mehamn
HØNNINGSVÅG
46G Honningsvåg
47S Laksfjord
47A/G Kifjordneset
46A Smines ved Altesula
46S Porsangerfjorden
PORSANGEN
L A K S F J O R D

MAP 22



48S Tanafjord
BERLEVÅG
TANAFJORD
BÅTSFJORD
48A Trollfjorden
49S Syltefjord
49A Nordfjorden
SYLTEFJORD
VARANGER PENINSULA

MAP 23



10A Skalneset
10A Skagodden
VADSØ
10S Varangfjorden
10B Varangerfjorden
10F Skogerøy
11X Brashavn
11A Sildkroneset, Bøkfj
KIRKENES
FINLAND
NORWAY
RUSSIA

MAP 24

Appendix G
Overview of materials and analyses 2001

Station positions are shown on maps in Appendix F

Appendix G1. Sampling and analyses for 2001, L-liver, F-fillet. (See Appendix G2 for descriptions of codes for analysis (M0, M1, M3, M4, M5, C2, C4, A1, G1), fish (P, F, D, L, M, C) and counts). Analytical overview for liver (-L) or fillet (-F) tissue is distinguished.

JAMP area		STATION	WATER	SEDIMENT				MUSSEL/			OTHER		FISH FLAT- (P,F,D,M)				COD- (C)			
													-L	M4	C2	A1	-L	M4	C2	A1
			M0	M1	C4	A1	G1	M3	C2	A1	M3	C2	-F	M5	C2	A1	-F	M5	C2	A1
26		**OSLOFJORD AREA CENTRAL**, Oslofjord proper																		
26	30A	Gressholmen	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	30B	Oslo city Area / Håøya	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
26	31A	Solbergstrand	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	33B	Sande, east side	.	.	.	.	.	.	.	.	.	.	F-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	F-F	5B	5B	.	.	.	.	.
26	35A	Mølen	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	36A	Færder	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
26	36B	Færder area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
20	36F	Færder area	.	.	.	.	.	.	.	.	.	.	D-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	D-F	5B	5B	.	.	.	.	.
26		**OSLOFJORD AREA WEST**, outer Sandefjord-Langesundsfjord																		
26	71A	Bjørkøya	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
		ARENDAL AREA																		
	76A	Risøy	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
		LISTA AREA																		
	15A	Ullerø area	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
	15B	Ullerø area	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
	15F	Ullerø area	.	.	.	.	.	.	.	.	.	.	D-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	D-F	5B	5B	.	.	.	.	.
		BØMLO-SOTRA AREA																		
	21D	Åkrafjord (2001)	.	.	.	.	.	.	.	.	.	.	T-L	4B	4B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	T-F	5B	4B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	N-L	4B	4B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	N-F	4B	4B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	R-L	2B	2B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	R-F	2B	2B	.	.	.	.	.
	21F	Kyrping (Åkrafjord 2000)	.	.	.	.	.	.	.	.	.	.	P-L	5B	5B	.	.	.	.	.
			.	.	.	.	.	.	.	.	.	.	P-F	5B	5B	.	.	.	.	.
	22A	Espevær, west	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
	23B	Karihavet	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
62		**HARDANGERFJORDEN**																		
62	69A	Lille Terøy	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
62	67B	Strandebarm											ML	5B	5B	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	MF	5B	5B	.	C-F	25	5B	.
62	65A	Vikingneset	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
62	63A	Ranaskjær	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
63		**SØRFJORDEN**																		
63	52A	Eitrheimsneset	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
63	53B	Inner Sørfjord	.	.	.	.	.	.	.	.	.	.	P-L	5B	5B	.	C-L	25	25	.
			.	.	.	.	.	.	.	.	.	.	P-F	5B	5B	.	C-F	25	5B	.
63	56A	Kvalnes	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.
63	57A	Krossanes	1	.	.	.	.	3[1]	3[1]	.	.	.	.	.	.	.	.	.	.	.

Appendix G1 (cont.)

JAMP area	**STATION**	WATER	SEDIMENT				MUSSEL/			OTHER		FISH							
												FLAT- (P,F,D,M)				COD- (C)			
												-L	M4	C2	A1	-L	M4	C2	A1
		M0	M1	C4	A1	G1	M3	C2	A1			-F	M5	C2	A1	-F	M5	C2	A1
	LOFOTEN AREA																		
98A	Husvågen (1997)	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
98B	Lille Molla	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
		.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
98F	Lille Molla	.	.	.	.	.	.	.	.	.	.	D-L	5B	5B	.	.	.	.	.
		.	.	.	.	.	.	.	.	.	.	D-F	5B	5B	.	.	.	.	.
	VARANGER PENINSULA AREA																		
10A	Skalneset	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.
10B	Varangerfjorden	.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-L	25	25	.
		.	.	.	.	.	.	.	.	.	.	.	.	.	.	C-F	25	5B	.
10F	Varangerfjorden	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
11X	Brashavn (1997)	1	.	.	.	.	3	3	.	.	.	.	.	.	.	.	.	.	.

NOTES:
[1]) Parallel samples collected for analysis that were frozen directly and not depurated prior to cleaning

Appendix G2: Key to analysis codes and sample counts used in Appendix G1.

ANALYSIS CODES:

Code	Analyses
M0	suspended matter
M1	Hg, Cd, Cu, Pb, Zn, Li (normalising element) total organic carbon (TOC)
M3	Hg, Cd, Cu, Pb, Zn
M4	Cd Cu Pb Zn (for fish liver)
M5	Hg (for fish fillet)
C1	CB-28,-52,-101,-105,-118,-138,-153,-156,-180, 209, 5-CB, OCS, a+gHCH, HCB, DDE, DDD, EPOCl (optional), dry weight percent
C2	CB-28,-52,-101,-105,-118,-138,-153,-156,-180, 209, 5-CB, OCS, a+gHCH, HCB, DDE, DDD, EPOCl (optional), fat and dry weight percent
A1	PAH
G1	Sediment core geological dating

SAMPLE COUNT CODES:

Medium	Count	Explanation
SEAWATER	1	sample for suspended matter determination
SEDIMENT	17	17 samples for metal analyses; two cores each with samples from 0-1, 1-2, 2-4, 4-6, 6-10, 10-15, 15-20 cm and deepest 5 cm slice plus one core with sample from 0-1 cm.
	4	4 samples for PCB or PAH analyses; two each cores with samples from 0-1cm and deepest 5cm slice.
	3	3 samples for metal analyses; three cores each with samples from 0-1cm.
MUSSEL	3/6	3 size groups (2-3, 3-4, 4-5 cm) each a bulk of ca.50 individuals and/or 1 size group (3-4 or 4-5 cm), 3 parallel samples each a bulk of 20 individuals.
	1/2	1 size group (2-3 or 3-4 cm), 2 parallel samples each a bulk of 50 individuals.
SHRIMP	2	2 samples of 100 individuals (edible size)
FISH		The number of individual fish or bulk samples of fish (-B) for analyses is shown. Bulk samples of fish consist of 5 fish. The five longest fish make up one bulk sample, the next five longest fish make up the another bulk sample and so on. The letter following the number indicates the fish type: D=dab, F=flounder, L=lemon sole, M=megrim, P=plaice, W=witch, C=cod, T=tusk, R=Rat fish, and N=Ling.

Appendix H
Temporal trend analyses of contaminants and biomarkers in biota 1981-2001

Sorted by contaminant, species and area/station:

Cadmium (Cd)
Mercury (Hg)
Lead (Pb)
Sum PCB-7 (CB: 28+52+101+118+138+153+180)
DDEPP (ppDDE)
γHCH (HCHG)
HCB
OH-pyrene
ALA-D (δ-amino levulinic acid dehydrase inhibition)
EROD (Cytochrome P4501A-activity)
MT (Metallothionein)

MYTI EDU - Blue Mussel (*Mytilus edulis*)
JAMP-stations
"Index"-stations
GADU MOR - Atlantic cod (*Gadus morhua*)
LEPI WHI - Megrim (*Lepidorhombus whiff-iagonis*)
LIMA LIM - Dab (*Limanda limanda*)
PLAT FLE - Flounder (*Platichthys flesus*)
(s) - Small fish
(l) - Large fish

Tsu **tissue**

SB - Soft body tissue
LI - Liver tissue
MU - Muscle tissue
BL - Blood
BI - Bile

OC	**Overconcentration expressed as quotient of median of last year and "high background" ("?" missing background value)**	
TRND	**trend**	
	D-	**Significant linear trend, downward**
	U-	**Significant linear trend, upward**
	--	**No significant trend**
	-?	**No significant linear trend, systematic non-linear trend can not be tested because of insufficient data (<6 years)**
	-Y	**No significant linear trend, but a systematic non-linear trend**
	DY or UY	**Significant linear trend (downward or upward) and a significant non-linear trend. This is considered the same as "-Y"**
	SIZE length effect (mercury in fillet)	
	L	**Significant difference in concentration levels but pattern of variation same**
	D	**As "L" but pattern of variation significantly different**
	-	**No significant difference between "small" and "large" fish**
SM+3	**Projected smoothed median for three years expressed as quotient of value and "high background" ("?" if missing background or if number of years is less than seven)**	
PWR	**POWER; estimated number of years to detect a hypothetical situation of 10% trend a year with a 90% power**	

Annual median concentration of CD
(ppm)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30A	MYTI EDU	SB	d.wt				1.07	0.81	1.41	0.6	0.61	0.736	0.769	0.769	1.12	1.26	1.17	0.776	0.8	0.857	1.27	1.16	1.13	0.914	no	--	no	10
31A	MYTI EDU	SB	d.wt			1.39	1.31	0.89	1.93	0.4	0.43	0.412	0.719	0.727	0.914	0.933	0.781	1.32	0.789	0.854	1.07	1.25	1	1.76	no	--	no	13
35A	MYTI EDU	SB	d.wt			1.35	0.952	1.17	1.3	0.52	0.66	0.647	0.926	1.05	1.35	1.11	0.958	0.894	0.766	0.965	1.14	1.53	1.33	1.53	no	UY	1.0	10
36A	MYTI EDU	SB	d.wt			0.845	1.19	0.84	1.38	0.59	0.56	0.502	0.407	1.22	1.06	0.899	1.22	1.17	1.6	1.84	0.965	1.01	1.65	2.59	1.3	U-	1.3	13
71A	MYTI EDU	SB	d.wt			2.52	1.98	1.42	2	0.98	2.11	2.02	0.968	1.09	1.66	1.89	1.97	2.25	1.5	2.44	1.53	1.76	1.99	1.43	no	--	no	12
76A	MYTI EDU	SB	d.wt										0.638	0.86	0.957	1.1			1.17	1.19	1.2	1.28	0.823	1.82	no	--	no	10
15A	MYTI EDU	SB	d.wt										0.505	0.831		1.18	0.794	1.44	1.22	1.07	1.03	0.841	1.44	4.4	2.2	U-	2.0	14
51A	MYTI EDU	SB	d.wt							42.8	58.2							36.8	25.3	5.45	10.3	34.6	27.3	5.35	2.7	--	5.0	22
52A	MYTI EDU	SB	d.wt									94.4	10.2	80.1	43.1	14.7	8.71	19.8	18.4	13.4	9.14	11.4	10.5	5.59	2.8	--	1.2	20
56A	MYTI EDU	SB	d.wt							55.9	54.2	98.4	45	69.4	51.7	59.7	11.4	30.8	20	28.8	8.71	25.9	24.4	14.5	7.2	D-	8.2	16
57A	MYTI EDU	SB	d.wt							21.1	43.2	36.7	25.7	32.8	32.1	15.4	11.8	12.2	8.48	13.6	5.02	13.6	10.3	8.19	4.1	D-	4.5	13
63A	MYTI EDU	SB	d.wt							47.2	10.3	19	30.4	35.1	18.2	7.81	4.23	8.16	5.4	6.62	4.43	6.87	5.97	6.73	3.4	D-	3.6	16
65A	MYTI EDU	SB	d.wt							15	5.96	8.29	14.6	24	5.09	7.73	3.01	5.37	3.53	4.28	1.72	3.82	3.85	4.5	2.2	D-	2.5	16
69A	MYTI EDU	SB	d.wt												4.26	2.37	2.08	2.91	3.2	3.53	1.58	3.76	2.87	3.8	1.9	--	2.0	13
22A	MYTI EDU	SB	d.wt										0.532	1.14	1.12	0.844	1.02	1.41	1.14	1.01	0.851	1.32	2.69	2.01	1.0	--	1.7	12
82A	MYTI EDU	SB	d.wt				1.41	1.15	2.31	0.99	0.4	1.26		1.2	1.21	1.15		0.981	1.22						no	--	no	15
84A	MYTI EDU	SB	d.wt				1.39	1.86	2.38	2.1	0.96	1.19		1.82	2.11	1.6		1.64	1.29						no	--	no	12
87A	MYTI EDU	SB	d.wt				0.968	1.02	1.93	0.77	0.69	0.756		0.872	0.978	0.927		1.15	1.27						no	--	no	12
91A	MYTI EDU	SB	d.wt												1.68	1.27	1.82								no	-?	?	11
92A	MYTI EDU	SB	d.wt												1.08	0.544	0.939	0.743	0.691	0.716					no	--	no	11
98A	MYTI EDU	SB	d.wt												1.08	1.09				0.854	1.58	2.17	1.68	2.38	1.2	--	1.7	11
98X	MYTI EDU	SB	d.wt														0.712	0.688	0.781						no	-?	?	6
41A	MYTI EDU	SB	d.wt														1.89	2.95	1.63	1.88					no	-?	?	12
43A	MYTI EDU	SB	d.wt														3.47	4.32		3.85					1.9	-?	?	8
44A	MYTI EDU	SB	d.wt														1.69	2.74	1.95	1.51					no	-?	?	12
46A	MYTI EDU	SB	d.wt														2.7	2.06	2.72						1.4	-?	?	10
48A	MYTI EDU	SB	d.wt														1.35	1.31	1.38						no	-?	?	<=5
10A	MYTI EDU	SB	d.wt														1.74	1.71	2.34	1.06	2.32	1.61	1.53	1.23	no	--	no	12
11A	MYTI EDU	SB	d.wt														1.31	1.28	1.07	1.59					no	-?	?	9
11X	MYTI EDU	SB	d.wt																	1.65	0.67	1.13	1.07	1.32	no	-?	?	14

Annual median concentration of CD
(ppm)

St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	ANALYSIS OC	TRND	SM+3	PWR
I021	MYTI EDU	SB	d.wt															1.73	2.26	2.48	3.31		1.83	2.53	1.3	--	no	11
I022	MYTI EDU	SB	d.wt															1.43	1.36	1.26	2.09	1.94	1.33	1.7	no	--	no	10
I023	MYTI EDU	SB	d.wt															1.61	1.4	1.77	2.04	1.45	0.948	0.873	no	--	no	9
I024	MYTI EDU	SB	d.wt															1.31	1.63	2.04	2.56	2.45	1.83	2.53	1.3	--	1.3	9
30A	MYTI EDU	SB	d.wt				1.07	0.81	1.41	0.6	0.61	0.736	0.769	0.769	1.12	1.26	1.17	0.776	0.8	0.857	1.27	1.16	1.13	0.914	no	--	no	10
I301	MYTI EDU	SB	d.wt															0.824	0.795	0.817	1.03	1.29	0.716	0.902	no	--	no	10
I304	MYTI EDU	SB	d.wt															1.33	0.719	0.784	1.05	0.994	0.921	1.16	no	--	no	10
I306	MYTI EDU	SB	d.wt															0.81	0.779	0.646	0.707	0.842	0.592	0.734	no	--	no	8
I307	MYTI EDU	SB	d.wt															0.94	0.815	0.687	0.72	0.826	0.719	0.899	no	--	no	7
I131	MYTI EDU	SB	d.wt															1.24	0.875	1.14	1.31	1.18	1.98	2.48	1.2	U-	1.7	9
I201	MYTI EDU	SB	d.wt															0.801	0.856	1.06	0.927	1.27	1.42	1.49	no	U-	no	6
I205	MYTI EDU	SB	d.wt															0.819		1.37	0.858	1.49	1.99	1.42	no	--	no	11
51A	MYTI EDU	SB	d.wt							42.8	58.2							36.8	25.3	5.45	10.3	34.6	27.3	5.35	2.7	--	5.0	22
52A	MYTI EDU	SB	d.wt									94.4	10.2	80.1	43.1	14.7	8.71	19.8	18.4	13.4	9.14	11.4	10.5	5.59	2.8	--	1.2	20
I962	MYTI EDU	SB	d.wt															0.746	0.606	0.645	0.518				no	-?	?	6
I969	MYTI EDU	SB	d.wt															0.502	0.599	0.318	0.611	0.588	0.827	0.76	no	--	no	11

Annual median concentration of CD
(ppm)

St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	ANALYSIS OC	TRND	SM+3	PWR
30B	GADU MOR	LI	w.wt				0.01	0.05	0.0619	0.0711	0.0218	0.0267	0.035	0.027	0.1	0.0645	0.063	0.049	0.045	0.045	0.107	0.165	0.078	0.111	1.1	--	1.7	17
36B	GADU MOR	LI	w.wt	0.078	0.06	0.22	0.07	0.05	0.137	0.0611	0.0314	0.028	0.0235	0.01	0.021	0.034	0.021	0.042	0.033	0.0741	0.036	0.065	0.041	0.029	no	DY	no	16
15B	GADU MOR	LI	w.wt										0.026	0.009	0.025	0.016	0.014	0.016	0.024	0.031	0.03	0.026	0.033	0.026	no	--	no	13
53B	GADU MOR	LI	w.wt						0.658		0.058	0.0929	0.045	0.149	0.215	0.038		0.007	0.18	0.143	0.228	0.726	0.829	0.565	5.6	--	16.5	>25
67B	GADU MOR	LI	w.wt							0.145	0.0519	0.0467	0.069	0.077	0.0514	0.115	0.0989	0.033	0.111	0.277	0.0185	0.0715	0.059	0.032	no	--	no	21
23B	GADU MOR	LI	w.wt										0.022	0.024	0.02	0.025	0.015	0.026	0.014	0.029	0.025	0.033	0.019	0.025	no	--	no	11
84B	GADU MOR	LI	w.wt				0.13	0.0949	0.0688		0.0291														no	D?	?	6
92B	GADU MOR	LI	w.wt													0.036	0.029	0.022	0.066						no	-?	?	16
98B	GADU MOR	LI	w.wt												0.069	0.15	0.025	0.113	0.33	0.064	0.047	0.039	0.14	0.279	2.8	--	2.4	23
43B	GADU MOR	LI	w.wt														0.168	0.183	0.097						no	-?	?	12
10B	GADU MOR	LI	w.wt														0.23	0.188	0.095	0.128	0.119	0.137	0.125	0.129	1.3	--	1.4	10

Annual median concentration of CD
(ppm)

St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	ANALYSIS OC	TRND	SM+3	PWR
33B	PLAT FLE	LI	w.wt			0.19		0.195	0.176	0.251	0.061	0.106	0.234	0.196	0.16	0.184	0.087	0.091	0.11	0.107	0.108	0.126	0.071	0.091	no	--	no	14
53B	PLAT FLE	LI	w.wt								2.24	1.53	1.54	1.72	1.79	0.789		0.135	2.53	0.892	1.47	2.55	1.77	2.74	9.1	--	12.9	21
67B	PLAT FLE	LI	w.wt																2.48		0.187	0.185	0.148	0.059	no	D?	?	17
36F	LIMA LIM	LI	w.wt										0.106	0.112	0.23	0.295	0.135	0.147	0.139	0.123	0.202	0.227	0.139	0.232	no	--	no	13
15F	LIMA LIM	LI	w.wt													0.0992	0.136	0.125	0.153	0.076	0.181	0.167		0.313	1.0	--	1.2	12
22F	LIMA LIM	LI	w.wt										0.095	0.091	0.128		0.169	0.125							no	-?	?	9
98F	LIMA LIM	LI	w.wt														0.98	0.182	0.225						no	-?	?	21
30F	PLEU PLA	LI	w.wt												0.11		0.101	0.222							1.1	-?	?	15
22F	PLEU PLA	LI	w.wt																0.23	0.231	0.244				1.2	-?	?	<=5
98F	PLEU PLA	LI	w.wt													0.1		0.747		0.324	0.203	0.214	0.821	0.521	2.6	--	3.7	21
10F	PLEU PLA	LI	w.wt																	0.571		0.141	0.248	0.302	1.5	-?	?	18
67B	LEPI WHI	LI	w.wt			0.181				0.18	0.109	0.066	0.197	0.085	0.1	0.12	0.304	0.259	0.2	0.097	0.033	0.051	0.037	0.049	m	DY	m	15

Annual median concentration of HG
(ppm)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30A	MYTI EDU	SB	d.wt				0.118	0.073	0.147	0.05	0.13	0.0437	0.0641	0.0533	0.0508	0.0703	0.0865	0.0574	0.07	0.0604	0.0778	0.114	0.0599	0.0586	no	--	no	13
31A	MYTI EDU	SB	d.wt			0.0757	0.164	0.086	0.12	0.05	0.09	0.0225	0.0599	0.0485	0.0508	0.0446	0.0502	0.0623	0.0435	0.0515	0.0699	0.0881	0.0464	0.051	no	--	no	14
35A	MYTI EDU	SB	d.wt			0.0933	0.0741	0.084	0.17	0.05	0.18	0.05	0.0617	0.0585	0.0578	0.0537	0.0607	0.0369	0.0383	0.0354	0.0667	0.101	0.028	0.0472	no	--	no	15
36A	MYTI EDU	SB	d.wt			0.0516	0.0427	0.084	0.14	0.05	0.14	0.034	0.0452	0.0476	0.0394	0.0321	0.0481	0.0333	0.0442	0.0743	0.0299	0.0455	0.0377	0.0245	no	--	no	14
71A	MYTI EDU	SB	d.wt			0.393	0.242	0.218	0.247	0.12	0.34	0.249	0.182	0.145	0.178	0.14	0.212	0.201	0.222	0.312	0.11	0.155	0.132	0.123	no	--	no	12
76A	MYTI EDU	SB	d.wt										0.0709	0.0682	0.0498	0.0205			0.057	0.0824	0.0632	0.101	0.0328	0.0634	no	--	no	16
15A	MYTI EDU	SB	d.wt										0.0561	0.0522		0.0244	0.0503	0.0217	0.0488	0.0558	0.0529	0.0437	0.163	0.0354	no	--	no	17
51A	MYTI EDU	SB	d.wt							0.24	0.25							1.51	0.901	0.175	0.577	2.89	3.86	0.774	3.9	--	16.5	>25
52A	MYTI EDU	SB	d.wt									2.35	0.321	3.01	0.976	0.372	0.282	0.437	0.178	0.26	0.258	0.58	0.34	0.298	1.5	--	2.2	20
56A	MYTI EDU	SB	d.wt							0.53	0.37	1.09	0.71	1.54	0.935	1.22	0.352	0.679	0.365	0.526	0.282	0.917	0.982	0.611	3.1	--	5.6	15
57A	MYTI EDU	SB	d.wt							0.17	0.21	0.269	0.411	0.758	0.576	0.349	0.35	0.26	0.155	0.319	0.166	0.467	0.451	0.349	1.7	UY	3.0	13
63A	MYTI EDU	SB	d.wt							0.31	0.14	0.177	0.394	0.468	0.294	0.143	0.19	0.252	0.172	0.203	0.226	0.268	0.299	0.365	1.8	--	2.4	13
65A	MYTI EDU	SB	d.wt							0.1	0.15	0.104	0.312	0.328	0.124	0.119	0.134	0.148	0.118	0.136	0.0792	0.142	0.155	0.189	no	--	1.1	13
69A	MYTI EDU	SB	d.wt												0.106	0.0263	0.0829	0.0704	0.104	0.111	0.0773	0.161	0.107	0.146	no	--	no	16
22A	MYTI EDU	SB	d.wt										0.0529	0.0732	0.112	0.0476	0.0673	0.0657	0.0723	0.0683	0.046	0.0736	0.0288	0.0545	no	--	no	13
82A	MYTI EDU	SB	d.wt				0.0508	0.11	0.17	0.08	0.12	0.0668		0.0743	0.0519	0.0787		0.0493	0.0691						no	--	no	13
84A	MYTI EDU	SB	d.wt				0.0766	0.112	0.15	0.08	0.24	0.0571		0.0657	0.0902	0.0568		0.0542	0.0433						no	--	no	15
87A	MYTI EDU	SB	d.wt				0.178		0.15	0.05	0.26	0.0462		0.0564	0.0543	0.0488		0.0439	0.0623						no	--	no	17
91A	MYTI EDU	SB	d.wt												0.0539	0.0758	0.0943								no	-?	?	<=5
92A	MYTI EDU	SB	d.wt												0.0548	0.0335	0.0521	0.0407	0.0234	0.067					no	--	no	14
98A	MYTI EDU	SB	d.wt												0.0865	0.0857				0.104	0.155	0.246	0.109	0.109	no	--	no	13
98X	MYTI EDU	SB	d.wt														0.335	0.34	0.328						1.6	-?	?	<=5
41A	MYTI EDU	SB	d.wt														0.0686	0.0635	0.064	0.0848					no	-?	?	8
43A	MYTI EDU	SB	d.wt														0.0844	0.0946		0.104					no	-?	?	<=5
44A	MYTI EDU	SB	d.wt														0.0552	0.05	0.0517	0.0592					no	-?	?	6
46A	MYTI EDU	SB	d.wt														0.0387	0.0618	0.0564						no	-?	?	10
48A	MYTI EDU	SB	d.wt														0.0726	0.0599	0.0524						no	-?	?	<=5
10A	MYTI EDU	SB	d.wt														0.0526	0.0488	0.0588	0.0617	0.0581	0.0625	0.0503	0.052	no	--	no	6
11A	MYTI EDU	SB	d.wt														0.182	0.145	0.0859	0.146					no	-?	?	13
11X	MYTI EDU	SB	d.wt																	0.0811	0.0366	0.0564	0.0667	0.065	no	-?	?	13

Annual median concentration of HG
(ppm)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
I021	MYTI EDU	SB	d.wt															0.212	0.397	0.496	0.859		0.356	0.436	2.2	--	no	16
I022	MYTI EDU	SB	d.wt															0.13	0.134	0.321	0.404	0.415	0.182	0.238	1.2	--	1.1	14
I023	MYTI EDU	SB	d.wt															0.14	0.143	0.295	0.31	0.263	0.0944	0.0959	no	--	no	14
I024	MYTI EDU	SB	d.wt															0.107	0.18	0.45	0.543	0.425	0.12	0.295	1.5	--	no	18
30A	MYTI EDU	SB	d.wt										0.0641	0.0533	0.0508	0.0703	0.0865	0.0574	0.07	0.0604	0.0778	0.114	0.0599	0.0586	no	--	no	11
I301	MYTI EDU	SB	d.wt															0.0656	0.0682	0.0582	0.0675	0.0625	0.0408	0.0677	no	--	no	9
I304	MYTI EDU	SB	d.wt															0.047	0.0694	0.0395	0.0541	0.0503	0.0294	0.0513	no	--	no	12
I306	MYTI EDU	SB	d.wt															0.0447	0.0617	0.0387	0.061	0.0508	0.0355	0.0353	no	--	no	10
I307	MYTI EDU	SB	d.wt															0.0383	0.0705	0.0337	0.0465	0.0542	0.0327	0.0488	no	--	no	12
I711	MYTI EDU	SB	d.wt																		0.382	0.287	0.198		no	D?	?	<=5
I712	MYTI EDU	SB	d.wt																		0.181	0.257	0.214	0.218	1.1	-?	?	9
I131	MYTI EDU	SB	d.wt															0.127	0.0691	0.0601	0.144	0.0635	0.0337	0.0784	no	--	no	16
I201	MYTI EDU	SB	d.wt																		0.101	0.132	0.157	0.169	no	U?	?	6
I205	MYTI EDU	SB	d.wt																		0.0974	0.171	0.205	0.167	no	-?	?	11
51A	MYTI EDU	SB	d.wt															1.51	0.901	0.175	0.577	2.89	3.86	0.774	3.9	--	16.5	>25
52A	MYTI EDU	SB	d.wt										0.321	3.01	0.976	0.372	0.282	0.437	0.178	0.26	0.258	0.58	0.34	0.298	1.5	--	2.2	20

Annual median concentration of HG
(ppm)

																								ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR (s)	MU	w.wt				0.125	0.0894	0.0788	0.0402	0.0585	0.121	0.12	0.09	0.11	0.122	0.102	0.08	0.108	0.131	0.117	0.153	0.173	0.224	2.2	U-L	2.9	11
30B	GADU MOR (l)	MU	w.wt				0.155	0.09	0.0735	0.0379	0.147	0.166	0.13	0.108	0.15	0.155	0.129	0.119	0.142	0.19	0.232	0.351	0.252	0.34	3.4	U-L	4.8	13
36B	GADU MOR (s)	MU	w.wt	0.069	0.08	0.11	0.0748	0.08	0.0612	0.0317	0.0529	0.0685	0.06	0.06	0.0592	0.0674	0.0535	0.0759	0.0665	0.0885	0.0778	0.06	0.072	0.0515	no	--L	no	10
36B	GADU MOR (l)	MU	w.wt	0.079	0.16	0.18	0.195	0.12	0.112	0.0393	0.083	0.0739	0.115	0.1	0.08	0.0829	0.0599	0.0946	0.0695	0.157	0.088	0.186	0.075	0.123	1.2	--L	1.1	13
15B	GADU MOR (s)	MU	w.wt										0.0648	0.04	0.026	0.018	0.045	0.0435	0.0585	0.0761	0.0435	0.023	0.0377	0.064	no	--L	no	15
15B	GADU MOR (l)	MU	w.wt										0.12	0.07	0.063	0.0394	0.081	0.0455	0.0874	0.108	0.09	0.0265	0.0465	0.0865	no	--L	no	16
53B	GADU MOR (s)	MU	w.wt						0.223		0.105	0.16	0.184	0.204	0.36	0.0896		0.0535	0.229	0.128	0.151	0.175	0.209	0.257	2.6	---	3.2	16
53B	GADU MOR (l)	MU	w.wt						0.196		0.105	0.203	0.17	0.269	0.396	0.141		0.0904	0.277	0.243	0.298	0.285	0.395	0.715	7.1	---	8.8	15
67B	GADU MOR (s)	MU	w.wt							0.1	0.0847	0.0902	0.0794	0.1	0.0847	0.0925	0.12	0.0712	0.073	0.117	0.0505	0.0575	0.0735	0.045	no	--L	no	11
67B	GADU MOR (l)	MU	w.wt							0.17	0.0847	0.102	0.255	0.13	0.141	0.0828	0.106	0.072	0.089	0.16	0.068	0.0595	0.107	0.092	no	--L	no	14
23B	GADU MOR (s)	MU	w.wt										0.0648	0.07	0.06	0.0415	0.0515	0.069	0.0595	0.073	0.075	0.0605	0.0833	0.0725	no	--L	no	8
23B	GADU MOR (l)	MU	w.wt										0.17	0.11	0.0837	0.0981	0.0735	0.109	0.057	0.105	0.116	0.113	0.107	0.097	no	--L	1.1	10
84B	GADU MOR (s)	MU	w.wt				0.0346	0.04	0.0246		0.0439														no	-?-	?	12
84B	GADU MOR (l)	MU	w.wt				0.06	0.04	0.0246		0.0439														no	-?-	?	14
92B	GADU MOR (s)	MU	w.wt													0.0464	0.0785	0.0795	0.077						no	-?-	?	10
92B	GADU MOR (l)	MU	w.wt													0.058	0.091	0.074	0.117						1.2	-?-	?	10
98B	GADU MOR (s)	MU	w.wt												0.0665	0.0543	0.069	0.0685	0.0395	0.095	0.0664	0.0465	0.0953	0.047	no	---	no	13
98B	GADU MOR (l)	MU	w.wt												0.065	0.064	0.069	0.0863	0.037	0.128	0.0895	0.043	0.09	0.0716	no	---	no	15
43B	GADU MOR (s)	MU	w.wt														0.065	0.054	0.047						no	-?-	?	<=5
43B	GADU MOR (l)	MU	w.wt														0.05	0.059	0.0568						no	-?-	?	6
10B	GADU MOR (s)	MU	w.wt														0.044	0.0339	0.0285	0.011	0.0135	0.0165	0.0105	0.009	no	D-L	no	11
10B	GADU MOR (l)	MU	w.wt														0.0555	0.0525	0.0395	0.02	0.019	0.032	0.015	0.0105	no	D-L	no	12

Annual median concentration of HG
(ppm)

																								ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
33B	PLAT FLE (s)	MU	w.wt			0.11		0.09	0.0769	0.019	0.0694		0.175	0.0877	0.116	0.0918	0.0694	0.053	0.048	0.076	0.0384	0.0455	0.0495	0.0293	no	---	no	16
33B	PLAT FLE (l)	MU	w.wt			0.139		0.1	0.0769	0.0238	0.0694		0.195	0.135	0.196	0.103	0.088	0.049	0.06	0.087	0.0699	0.119	0.0778	0.059	no	---	no	15
53B	PLAT FLE (s)	MU	w.wt								0.111	0.0738	0.139	0.154	0.141	0.0712		0.0352	0.165	0.13	0.165	0.249	0.289	0.333	3.3	---	5.4	15
53B	PLAT FLE (l)	MU	w.wt								0.111	0.128	0.09	0.124	0.1	0.116		0.0356	0.208	0.221	0.257	0.157	0.233	0.438	4.4	---	4.6	16
67B	PLAT FLE (s)	MU	w.wt																0.1		0.0426	0.0363	0.0638	0.0442	no	-?-	?	13
67B	PLAT FLE (l)	MU	w.wt																0.246		0.0608	0.0337	0.082	0.0678	no	-?-	?	19
36F	LIMA LIM (s)	MU	w.wt										0.0447	0.0707	0.066	0.0703	0.0495	0.0539	0.0487	0.0306	0.0615	0.0375	0.0563	0.041	no	--L	no	11
36F	LIMA LIM (l)	MU	w.wt										0.098	0.0742	0.133	0.101	0.0756	0.0997	0.0659	0.0906	0.0915	0.0676	0.102	0.0989	no	--L	1.1	10
15F	LIMA LIM (s)	MU	w.wt											0.09		0.038	0.0368	0.0245	0.0374	0.0475	0.042	0.036		0.0548	no	--L	no	12
15F	LIMA LIM (l)	MU	w.wt											0.15		0.034	0.036	0.0564	0.108	0.0727	0.0884	0.059		0.165	1.6	--L	1.5	18
22F	LIMA LIM (s)	MU	w.wt										0.0837	0.04	0.207		0.045	0.063							no	-?-	?	20
22F	LIMA LIM (l)	MU	w.wt										0.174	0.152	0.282		0.223	0.372							3.7	-?-	?	11
30F	PLEU PLA (s)	MU	w.wt												0.058		0.0275	0.0372							no	-?-	?	13
30F	PLEU PLA (l)	MU	w.wt												0.035		0.0559	0.0476							no	-?-	?	10
22F	PLEU PLA (s)	MU	w.wt																0.0287	0.0431	0.0495				no	-?-	?	7
22F	PLEU PLA (l)	MU	w.wt																0.0506	0.0505	0.0827				no	-?-	?	9
98F	PLEU PLA (s)	MU	w.wt													0.017		0.0475		0.0384	0.0292	0.049	0.0579	0.0588	no	---	no	13
98F	PLEU PLA (l)	MU	w.wt													0.025		0.0751		0.0259	0.0588	0.049	0.164	0.0896	no	---	1.8	17
10F	PLEU PLA (s)	MU	w.wt																	0.032		0.014	0.029	0.019	no	-?-	?	15
10F	PLEU PLA (l)	MU	w.wt																	0.0415		0.0339	0.031	0.024	no	D?-	?	6
67B	LEPI WHI (s)	MU	w.wt															0.364	0.398	0.172	0.0663	0.11	0.104	0.0936	m	D-D	m	14
67B	LEPI WHI (l)	MU	w.wt															0.341	0.372	0.331	0.275	0.392	0.33	0.237	m	--D	m	9

Annual median concentration of PB
(ppm)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30A	MYTI EDU	SB	d.wt										1.86	1.36	3.95	2.27	2.54	1.58	2.12	2.69	36.7	2.13	1.74	1.76	no	--	no	23
31A	MYTI EDU	SB	d.wt										1.38	1.21	1.26	1.03	1.37	1.68	1.79	0.732	1.54	0.629	0.629	0.51	no	D-	no	12
35A	MYTI EDU	SB	d.wt										1.44	1.07	1.68	1.2	1.28	0.507	0.628	0.664	0.759	0.714	0.522	0.866	no	D-	no	11
36A	MYTI EDU	SB	d.wt										1.01	0.847	0.787	1.12	1.39	1.24	2.04	2.17	1.57	0.995	0.943	0.618	no	UY	no	10
71A	MYTI EDU	SB	d.wt										1.16	0.745	1.72	1.42	1.92	1.49	2.21	2.83	0.867	0.903	0.774	1.45	no	--	no	14
76A	MYTI EDU	SB	d.wt										1.77	0.968	1.5	0.913			0.796	1.84	1.23	1.99	0.602	0.829	no	--	no	14
15A	MYTI EDU	SB	d.wt										1.46	0.777		0.976	1.05	0.522	0.671	1.12	1.28	1.66	2.2	0.96	no	--	no	13
51A	MYTI EDU	SB	d.wt															149	60.3	17.2	29.6	37.1	91.7	32.4	10.8	--	19.5	20
52A	MYTI EDU	SB	d.wt										12.1	313	189	65.5	16.4	17.5	9.84	20.6	14.7	11.6	11	21.8	7.3	--	5.8	25
56A	MYTI EDU	SB	d.wt										20.7	23.4	121	109	24.7	46.4	27.8	37.5	15.7	30.3	28.5	30.5	10.2	--	10.1	18
57A	MYTI EDU	SB	d.wt										10.5	12.1	33.3	19.2	15.1	13.2	5.6	13.7	6.15	10.4	10.3	11.9	4.0	--	4.5	14
63A	MYTI EDU	SB	d.wt										12.1	10.1	15.4	10.9	7.22	12.1	7.6	6.1	6.39	4.84	4.52	7.05	2.4	D-	1.6	11
65A	MYTI EDU	SB	d.wt										5.61	3.78	5.19	6.53	3.28	4.73	2.41	3	1.77	1.63	2.45	2.84	no	D-	no	12
69A	MYTI EDU	SB	d.wt												4.62	3.42	2.8	3.17	4.02	3.66	1.98	3.4	2.27	3.91	1.3	--	1.1	11
22A	MYTI EDU	SB	d.wt										1.37	1.46	2.78	1.87	1.39	1.18	1.51	1.37	1.21	1.7	1.3	1.21	no	--	no	11
82A	MYTI EDU	SB	d.wt											1.28	0.933	0.916		0.622	0.674						no	D?	?	7
84A	MYTI EDU	SB	d.wt											1.01	1.15	1.38		1.38	0.833						no	-?	?	11
87A	MYTI EDU	SB	d.wt											0.974	0.87	0.634		1.4	2.47						no	-?	?	14
91A	MYTI EDU	SB	d.wt												0.898	1.46	2.01								no	-?	?	6
92A	MYTI EDU	SB	d.wt												0.933	0.628	1.09	0.664	0.654	2.18					no	--	1.4	16
98A	MYTI EDU	SB	d.wt												1.87	1.85				1.54	2.36	1.59	1.49	1.34	no	--	no	9
98X	MYTI EDU	SB	d.wt														4.34	3.12	4.11						1.4	-?	?	11
41A	MYTI EDU	SB	d.wt														1.29	0.9	0.793	0.651					no	D?	?	6
43A	MYTI EDU	SB	d.wt														1.56	1.51		0.855					no	-?	?	8
44A	MYTI EDU	SB	d.wt														2.81	2.57	1.66	1.15					no	D?	?	7
46A	MYTI EDU	SB	d.wt														1.26	1.57	1.38						no	-?	?	8
48A	MYTI EDU	SB	d.wt														0.682	1.08	0.333						no	-?	?	19
10A	MYTI EDU	SB	d.wt														1.94	2.78	0.735	0.807	2.34	1.57	1.44	1.39	no	--	no	17
11A	MYTI EDU	SB	d.wt														1.54	1.48	0.336	0.367					no	-?	?	16
11X	MYTI EDU	SB	d.wt																	0.743	0.521	0.314	1.09	2.32	no	-?	?	19

Annual median concentration of PB
(ppm)

St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	ANALYSIS OC	TRND	SM+3	PWR
I021	MYTI EDU	SB	d.wt															1.06	2.29	1.65	2.12		0.99	1.65	no	--	no	14
I022	MYTI EDU	SB	d.wt															1	0.599	1.18	1.31	1.94	1.05	0.952	no	--	no	13
I023	MYTI EDU	SB	d.wt															0.774	1.27	1.38	1.7	1.38	0.636	0.616	no	--	no	12
I024	MYTI EDU	SB	d.wt															0.971	1.1	1.16	1.7	1.79	0.617	1.33	no	--	no	14
30A	MYTI EDU	SB	d.wt										1.86	1.36	3.95	2.27	2.54	1.58	2.12	2.69	36.7	2.13	1.74	1.76	no	--	no	23
I301	MYTI EDU	SB	d.wt																		2.47	2.11	1.32	3.16	1.1	-?	?	15
I304	MYTI EDU	SB	d.wt																		2.23	1.19	0.765	1.88	no	-?	?	17
I306	MYTI EDU	SB	d.wt																		1.34	0.678	0.542	1.03	no	-?	?	15
I307	MYTI EDU	SB	d.wt																		1.05	0.798	0.513	1.01	no	-?	?	14
I201	MYTI EDU	SB	d.wt															3.54	4.39	4.77	4.67	4.43	6.41	3.78	1.3	--	1.5	9
I205	MYTI EDU	SB	d.wt															4.77		6.96	4	5.97	7.09	6.15	2.1	--	2.3	10
51A	MYTI EDU	SB	d.wt															149	60.3	17.2	29.6	37.1	91.7	32.4	10.8	--	19.5	20
52A	MYTI EDU	SB	d.wt										12.1	313	189	65.5	16.4	17.5	9.84	20.6	14.7	11.6	11	21.8	7.3	--	5.8	25
I962	MYTI EDU	SB	d.wt															4.44	5.34	3.55	2.99				no	-?	?	9
I969	MYTI EDU	SB	d.wt															2.47	2.08	1.62	2.91	5.13	3	2.57	no	--	1.3	14

Annual median concentration of PB
(ppm)

St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	ANALYSIS OC	TRND	SM+3	PWR
30B	GADU MOR	LI	w.wt										0.2	0.115	0.249	0.105	0.12	0.11	0.06	0.1	0.163	0.85	0.24	0.22	2.2	--	5.4	18
36B	GADU MOR	LI	w.wt										0.115	0.05	0.03	0.02	0.03	0.02	0.03	0.04	0.03	0.04	0.04	0.03	no	DY	no	11
15B	GADU MOR	LI	w.wt										0.17	0.06	0.03	0.03	0.03	0.02	0.03	0.04	0.03	0.03	0.04	0.03	no	DY	no	12
53B	GADU MOR	LI	w.wt										0.19	0.26	0.14	0.03		0.02	0.0748	0.07	0.105	0.115	0.13	0.13	1.3	--	2.0	17
67B	GADU MOR	LI	w.wt										0.13	0.18	0.03	0.0748	0.09	0.04	0.04	0.09	0.03	0.04	0.04	0.03	no	--	no	17
23B	GADU MOR	LI	w.wt										0.06	0.08	0.03	0.03	0.03	0.02	0.03	0.04	0.03	0.04	0.03	0.03	no	--	no	11
92B	GADU MOR	LI	w.wt													0.02	0.03	0.03	0.04						no	-?	?	7
98B	GADU MOR	LI	w.wt												0.03	0.03	0.03	0.04	0.04	0.05	0.03	0.03	0.04	0.03	no	--	no	9
43B	GADU MOR	LI	w.wt														0.03	0.03	0.03						no	-?	?	<=5
10B	GADU MOR	LI	w.wt														0.03	0.02	0.04	0.04	0.04	0.03	0.04	0.03	no	--	no	11

Annual median concentration of PB
(ppm)

St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	ANALYSIS OC	TRND	SM+3	PWR
33B	PLAT FLE	LI	w.wt										0.24	0.35	0.06	0.03	0.03	0.02	0.03	0.04	0.04	0.04	0.04	0.03	no	DY	no	14
53B	PLAT FLE	LI	w.wt										0.71	0.81	0.41	0.23		0.0245	0.46	0.35	0.52	0.46	0.357	0.57	1.9	--	2.2	23
67B	PLAT FLE	LI	w.wt																0.35		0.03	0.03	0.03	0.03	no	-?	?	20
36F	LIMA LIM	LI	w.wt										0.6	0.07	0.04	0.07	0.03	0.02	0.03	0.05	0.05	0.05	0.06	0.04	no	DY	no	17
15F	LIMA LIM	LI	w.wt											0.07		0.0408	0.03	0.02	0.03	0.05	0.04	0.0346		0.05	no	--	no	12
22F	LIMA LIM	LI	w.wt										0.25	0.16	0.0424		0.06	0.07							no	-?	?	18
98F	LIMA LIM	LI	w.wt														0.02	0.04	0.03						no	-?	?	14
30F	PLEU PLA	LI	w.wt												0.739		0.54	0.57							2.8	-?	?	7
22F	PLEU PLA	LI	w.wt																0.28	0.28	0.46				2.3	-?	?	9
98F	PLEU PLA	LI	w.wt													0.03		0.31		0.05	0.04	0.22	0.104	0.04	no	--	no	>25
10F	PLEU PLA	LI	w.wt																	0.15		0.0648	0.08	0.05	no	-?	?	10
67B	LEPI WHI	LI	w.wt										0.19	0.07	0.06	0.07	0.04	0.07	0.03	0.04	0.04	0.03	0.03	0.04	m	D-	m	12

Annual median concentration of CB_S7
(ppb)

																								ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30A	MYTI EDU	SB	d.wt								77.5	96.5	116	89.6	97		89.3	90.4	110	128	58.5	71.1	49.9	29.6	1.5	DY	no	10
31A	MYTI EDU	SB	d.wt								21.7	24.9	37.1	24.7	34.6		52.2	49	63.8	24.6	12.9	18	6.49	8.87	no	DY	no	13
35A	MYTI EDU	SB	d.wt								21.5	33.6	27.5	14.2	22.1		13.4	13.6	10.7	16.5	12.5	14.6	5.52	7.32	no	D-	no	12
36A	MYTI EDU	SB	d.wt								11	17.9	19.3	7.94	11.2		5.69	10.5	12.3	12.7	8.62	12.1	5.28	5.54	no	--	no	13
71A	MYTI EDU	SB	d.wt								17	34.4	25	14.2	15.3		16.5	10.5		9.27	11.8	13.6	8.52	12.7	no	--	no	12
76A	MYTI EDU	SB	d.wt										16.6	6.49	7.21				16.3	19.1	14.4	16.4	6.34	6.78	no	--	no	15
15A	MYTI EDU	SB	d.wt										11.8				6.29	3.06	2.41	3.88	4.72	5.28	2.56	4.19	no	--	no	14
51A	MYTI EDU	SB	d.wt															26.2	9.69	14.7	10.5	11.5	12	28	1.4	--	1.3	14
52A	MYTI EDU	SB	d.wt									40.2	14.9		11.3	11.3	17.1	16.9	10	19	10.6	11.2	7.19	74.2	3.7	--	2.1	19
56A	MYTI EDU	SB	d.wt								12.5	45.8	37.7	12.1	12	9.41	13.8	11.9		16.8	9.55	11.2	5.98	216	10.8	--	4.2	23
57A	MYTI EDU	SB	d.wt									28		7.63	7.55	4.74	8.38	6.54	4.18	8.41	10.3	8.16	3.89	55.9	2.8	--	1.7	20
63A	MYTI EDU	SB	d.wt									21.8		9.71	6.45	3.68	5.7	5.72		4.15	7.95	7.26	4.09	13.8	no	--	no	14
65A	MYTI EDU	SB	d.wt								6.05	11.1	33.4	9.29	5.59	3.69	5.55	3.37	5.19	3.76	7.62	6.44	3	8.31	no	--	no	17
69A	MYTI EDU	SB	d.wt												4.82		4.97	4.51	2.77	5.41	12.6	5.83	2.53	5.7	no	--	no	17
22A	MYTI EDU	SB	d.wt										18.9	8.23	8.61		7.97	6.84	5.19	4.69	11.5	6.01	5.14	4.69	no	--	no	12
84A	MYTI EDU	SB	d.wt								5.25	20.5		5.05	8.44			3.6	6.37						no	--	no	18
92A	MYTI EDU	SB	d.wt												4.46	2.49	5.83	4.05	2.89	7.74					no	--	no	15
98A	MYTI EDU	SB	d.wt												20.5	5.68				10.7	8.4	4.14	3.54	4.56	no	--	no	15
98X	MYTI EDU	SB	d.wt														87.3	78.4	46.4						2.3	-?	?	9
41A	MYTI EDU	SB	d.wt														3.49	4.26	2.39	2.58					no	-?	?	10
43A	MYTI EDU	SB	d.wt														2.92	3.1		3.02					no	-?	?	<=5
44A	MYTI EDU	SB	d.wt															7.31	8.46	29.4					1.5	-?	?	15
46A	MYTI EDU	SB	d.wt														5.74	4.16	3.11						no	D?	?	<=5
48A	MYTI EDU	SB	d.wt														6.22	4.04	3.1						no	-?	?	6
10A	MYTI EDU	SB	d.wt														6.03	4.29	4.66	6.29		5.11	4.33	3.03	no	--	no	9
11A	MYTI EDU	SB	d.wt														7.48	6.92	4.32	5.75					no	-?	?	10
11X	MYTI EDU	SB	d.wt																	3.34	3.56	4.48	2.79	3.1	no	-?	?	9

Annual median concentration of CB_S7
(ppb)

																								ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
I021	MYTI EDU	SB	d.wt															43.1	31.8	32.2	24.1		22.2	20	no	D-	no	7
I022	MYTI EDU	SB	d.wt															32.1	25.9	41.2	22.4	28.9	19.2	22.4	1.1	--	no	10
I023	MYTI EDU	SB	d.wt															19.6	20.9	26	15	22.2	10.8	17.4	no	--	no	12
I024	MYTI EDU	SB	d.wt															31.8	36.1	45.6	36.6	28.7	16.8	17.7	no	D-	no	10
30A	MYTI EDU	SB	d.wt								77.5	96.5	116	89.6	97		89.3	90.4	110	128	58.5	71.1	49.9	29.6	1.5	DY	no	10
I301	MYTI EDU	SB	d.wt															118	113	182	86.5	125	58.7	64.6	3.2	--	1.1	12
I304	MYTI EDU	SB	d.wt															35.2	23.8	44.4	35.9		19.9	25	1.3	--	no	12
I306	MYTI EDU	SB	d.wt															16.4	15.7	54.2	26.1		21.8	17.2	no	--	no	16
I307	MYTI EDU	SB	d.wt															20.6	28.5	40.2	17.3		20.3	16.9	no	--	no	12
71A	MYTI EDU	SB	d.wt								17	34.4	25	14.2	15.3		16.5	10.5		9.27	11.8	13.6	8.52	12.7	no	--	no	12
I711	MYTI EDU	SB	d.wt															24.8	13.3	13.3	20.6	21.6	18.4		no	--	no	12
I712	MYTI EDU	SB	d.wt															33.3	31.2	25.3	22.4	24.9	13.9	12.5	no	D-	no	8
I131	MYTI EDU	SB	d.wt															7.94	11.7	13.1	22.4	12.7	10.1	14	no	--	no	12
I132	MYTI EDU	SB	d.wt															27.5	33.7	32	31.1	22.5	10.2	15.8	no	--	no	12
I133	MYTI EDU	SB	d.wt															22.8	22.3	21.5	24.7	23	10.4	11.7	no	--	no	10
51A	MYTI EDU	SB	d.wt															26.2	9.69	14.7	10.5	11.5	12	28	1.4	--	1.3	14
52A	MYTI EDU	SB	d.wt									40.2	14.9		11.3	11.3	17.1	16.9	10	19	10.6	11.2	7.19	74.2	3.7	--	2.1	19
I241	MYTI EDU	SB	d.wt															54.3	78.9	47.2	55.2	80.8	55.5	36.3	1.8	--	1.7	12
I242	MYTI EDU	SB	d.wt															63	81.6	29.6	45.6	59.5	36.6	26.2	1.3	--	no	14
I243	MYTI EDU	SB	d.wt															115	169	122	78.2	92.4	47.9	29.3	1.5	D-	no	11

Annual median concentration of CB_S7
(ppb)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR	LI	w.wt										1240	3430	2800	2500	2910	2350	2790	3240	3660	3520	2080	2440	4.9	--	3.7	11
36B	GADU MOR	LI	w.wt										441	344	396	636	376	1650	974	720	735	766	482	288	no	--	no	14
15B	GADU MOR	LI	w.wt										182	349	266	182	295	307	274	399	279	257	153	377	no	--	no	13
53B	GADU MOR	LI	w.wt										435	524	1760	166		162	701	576	2370	487	1520	842	1.7	--	2.5	23
67B	GADU MOR	LI	w.wt										316	293	268	226	329	209	269	627	206	273	148	225	no	--	no	13
23B	GADU MOR	LI	w.wt										222	244	228	208	128	193	196	125	179	229	207	167	no	--	no	10
92B	GADU MOR	LI	w.wt													135	152	311	369						no	U?	?	9
98B	GADU MOR	LI	w.wt												239	183	114	197	278	372	165	147	131	114	no	--	no	13
43B	GADU MOR	LI	w.wt														325	329	140						no	-?	?	13
10B	GADU MOR	LI	w.wt														645	485	210	189	168	255	99.4	109	no	D-	no	13
30B	GADU MOR	MU	w.wt										3.58	11.1	24.7	9.65	3.94	3.12	8.46	11.8	21.7	21.4	6.05	9.4	1.9	--	1.4	20
36B	GADU MOR	MU	w.wt										1.61	1.28	2	3.65	0.525	15.6	4.14	4.53	3.77	2.86	2.26	2.19	no	--	no	22
15B	GADU MOR	MU	w.wt										1.35	1.22	1.38	0.65	0.38	1.02	1.13	1.44	1.41	0.81	1.42	1.88	no	--	no	14
53B	GADU MOR	MU	w.wt										8.2	2.23	15	1.1		0.37	21.9	3.76	138	6.61	36.3	1.08	no	--	no	>25
67B	GADU MOR	MU	w.wt										0.835	1.43	1.1	0.624	1.15	0.605	3.49	7.07	0.73	1.72	1.18	9.98	2.0	--	no	23
23B	GADU MOR	MU	w.wt										0.64	2.25	0.75	0.85	0.18	0.625	0.46	0.81	1.49	0.95	0.45	0.62	no	--	no	19
92B	GADU MOR	MU	w.wt													0.55	0.225	0.36	0.905						no	-?	?	19
98B	GADU MOR	MU	w.wt												0.9	0.9	0.135	0.34	0.475	1.4	0.44	0.585	2.02	1.48	no	--	no	21
43B	GADU MOR	MU	w.wt														0.515	0.815	0.39						no	-?	?	16
10B	GADU MOR	MU	w.wt														1.76	2.48	0.367	0.9	0.79	1.39	0.5	0.55	no	--	no	19

Annual median concentration of CB_S7
(ppb)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
33B	PLAT FLE	LI	w.wt										36	31.1	97.5	69	57	86	38.3	40.4	30.5	47.2	90.7	158	1.6	--	2.1	14
53B	PLAT FLE	LI	w.wt										509	517	309	36		22.8	115	113	111	156	95.8	95.1	no	--	1.0	20
67B	PLAT FLE	LI	w.wt																70		96.9	45.8	44	36.2	no	-?	?	12
33B	PLAT FLE	MU	w.wt										2.04	3.96	1.8	0.95	0.51	1.37	1.37	0.995	0.85	5.32	1.14	1.76	no	--	no	19
53B	PLAT FLE	MU	w.wt										27.4	33.2	14.2	1.45		0.757	3.19	2.74	2.19	2.73	3	2.67	no	DY	no	20
67B	PLAT FLE	MU	w.wt																0.775		1.8	1.66	1.48	0.95	no	-?	?	14
36F	LIMA LIM	LI	w.wt										301	217	339	418	404	433	386	387	236	412	838	527	1.1	--	1.7	12
15F	LIMA LIM	LI	w.wt											124		58.2	77	74	62.5	64.4	51.1	69.6		106	no	--	no	11
22F	LIMA LIM	LI	w.wt										170	127	140		60	88.7							no	-?	?	11
36F	LIMA LIM	MU	w.wt										2.76	7.05	5.6	7.8	5.9	8.18	9.62	5.18	9.41	3.88	8.38	7.73	no	--	no	13
15F	LIMA LIM	MU	w.wt											3.72		0.806	0.369	1.13	1.81	1.28	1.41	0.959		1.21	no	--	no	19
22F	LIMA LIM	MU	w.wt										1.97	5	3.82		1.24	5.14							no	-?	?	20
98F	LIMA LIM	MU	w.wt														0.845	1.34	3.3						no	-?	?	9
30F	PLEU PLA	LI	w.wt												313		207	216							4.3	-?	?	8
22F	PLEU PLA	LI	w.wt																21	20.1	14.5				no	-?	?	7
98F	PLEU PLA	LI	w.wt													9.38		37.5		27.8	24.1	24.7	40.8	25.5	no	--	no	15
10F	PLEU PLA	LI	w.wt																	42.1		62.8	45	24.9	no	-?	?	14
30F	PLEU PLA	MU	w.wt												6.82		3.01	1.45							no	-?	?	9
22F	PLEU PLA	MU	w.wt																1.39	0.95	3.33				1.7	-?	?	19
98F	PLEU PLA	MU	w.wt													0.45		2.51		0.581	0.83	0.435	1.54	0.6	no	--	no	21
10F	PLEU PLA	MU	w.wt																	0.97		2.58	1.78	1.12	no	-?	?	17
67B	LEPI WHI	LI	w.wt										111	100	143	101	172	166	97.2	91.5	118	82.3	83.8	63.8	m	--	m	10
67B	LEPI WHI	MU	w.wt										0.84	0.935	1.4	0.55	0.48	1.45	0.445	0.68	0.42	1.03	0.82	0.673	m	--	m	16

Annual median concentration of DDEPP
(ppb)

																								ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30A	MYTI EDU	SB	d.wt												5.24	3.86	7.08	5.7	2.56	5.88	3.87	5.91	3.47	1.99	no	--	no	14
31A	MYTI EDU	SB	d.wt												3.3	1.89	3.45	1.84	0.505	3.37	3.49	5.47	1.19	2.1	no	--	no	21
35A	MYTI EDU	SB	d.wt												4.91	2.08	3.13	2.84	0.57	3.91	3.73	5.93	1.61	3.29	no	--	no	20
36A	MYTI EDU	SB	d.wt												2.76	1.06	1.03	1.76	0.442	2.11	1.79	2.98	1.48	1.51	no	--	no	18
71A	MYTI EDU	SB	d.wt												2.61	1.58	3.21	1.29	0.736	1.02	2.2	2.41	2.26	3.58	no	--	no	14
76A	MYTI EDU	SB	d.wt												1.4	0.794			0.355	1.21	2.29	2.49	0.779	0.829	no	--	no	20
15A	MYTI EDU	SB	d.wt													0.976	1.72	0.735	0.294	1.02	1.41	2.05	0.536	0.622	no	--	no	19
51A	MYTI EDU	SB	d.wt															33.9	6.67	14.7	17.1	13.2	16.9	5.48	no	--	no	19
52A	MYTI EDU	SB	d.wt												12.3	25.5	19.4	18.5	9.53	13.1	16.7	13.7	11.9	6.47	no	--	no	13
56A	MYTI EDU	SB	d.wt												50	47.5	115	40.8	33.9	72.3	52.6	39.8	26.2	60.6	6.1	--	3.9	16
57A	MYTI EDU	SB	d.wt												25.9	18.3	35	25.3	15.8	50	82.9	35.2	27.5	24.7	2.5	--	1.7	16
63A	MYTI EDU	SB	d.wt												12.9	9.29	9.68	8.36	5.53	13	15.5	11.4	10.2	7.09	no	--	no	12
65A	MYTI EDU	SB	d.wt												7.6	5.19	7.79	4.12	5	6.9	11.9	7.38	6.76	5.43	no	--	no	12
69A	MYTI EDU	SB	d.wt												3.55	3.16	3.54	2.91	0.4	3.69	6.52	2.61	2.7	2.25	no	--	no	22
22A	MYTI EDU	SB	d.wt												2.22	1.31	1.88	1.45	0.387	1.37	5.11	1.96	1.49	0.909	no	--	no	20
84A	MYTI EDU	SB	d.wt												3.12	2.23		0.985	0.736						no	D?	?	<=5
92A	MYTI EDU	SB	d.wt												0.68	2.09	1.41	0.766	0.275	1.93					no	--	no	22
98A	MYTI EDU	SB	d.wt												5.81	2.29				1.59	1.87	0.87	0.575	1.31	no	D-	no	15
98X	MYTI EDU	SB	d.wt														31.6	22.9	5.16						no	-?	?	15
41A	MYTI EDU	SB	d.wt														0.621	0.423	0.291	0.61					no	-?	?	15
44A	MYTI EDU	SB	d.wt															0.486	0.343	1.41					no	-?	?	20
46A	MYTI EDU	SB	d.wt														1.05	0.756	0.273						no	-?	?	11
48A	MYTI EDU	SB	d.wt														1.71	1.13	0.286						no	-?	?	14
10A	MYTI EDU	SB	d.wt														0.848	0.78	0.439	1.49		1.45	0.611	0.867	no	--	no	16
11A	MYTI EDU	SB	d.wt														1.3	1.88	0.408	1.23					no	-?	?	21
11X	MYTI EDU	SB	d.wt																	0.811	1.04	1.04	0.769	0.758	no	-?	?	9

Annual median concentration of DDEPP
(ppb)

																									ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
I021	MYTI EDU	SB	d.wt															4.6	1.45	4.8	3.25		5.19	2.73	no	--	no	17
I022	MYTI EDU	SB	d.wt															3.95	1.38	7.13	4.58	7.96	4.92	3.73	no	--	no	18
I023	MYTI EDU	SB	d.wt															1.81	1.32	3.79	2.32	6.1	2.39	2.91	no	--	no	16
I024	MYTI EDU	SB	d.wt															3.5	3.52	8.91	7.17	8.96	4.94	2.52	no	--	no	15
30A	MYTI EDU	SB	d.wt												5.24	3.86	7.08	5.7	2.56	5.88	3.87	5.91	3.47	1.99	no	--	no	14
I301	MYTI EDU	SB	d.wt															2.59	3.75	17.8	5.96	7.45	5.58	4.51	no	--	no	18
I304	MYTI EDU	SB	d.wt															2.14	0.751	3.42	3.89		1.95	2.71	no	--	no	18
I306	MYTI EDU	SB	d.wt															1.84	0.455	4.25	3.31		2.37	1.88	no	--	no	22
I307	MYTI EDU	SB	d.wt															2.18	1.03	3.42	2.74		2.12	4.13	no	--	no	15
I711	MYTI EDU	SB	d.wt															3.46	0.719	1.49	2.19	2.18	3.85		no	--	no	18
I712	MYTI EDU	SB	d.wt															2.43	1.34	3.14	3.09	3.49	3.46	2.48	no	--	no	12
I131	MYTI EDU	SB	d.wt															1.46	0.691	1.89	2.06	1.67	1.11	0.915	no	--	no	14
I132	MYTI EDU	SB	d.wt															1.88	1.36	2.15	2.02	2.06	1.19	1.15	no	--	no	10
I133	MYTI EDU	SB	d.wt															2.16	0.879	1.62	1.93	2.73	1.16	1.11	no	--	no	15
51A	MYTI EDU	SB	d.wt															33.9	6.67	14.7	17.1	13.2	16.9	5.48	no	--	no	19
52A	MYTI EDU	SB	d.wt												12.3	25.5	19.4	18.5	9.53	13.1	16.7	13.7	11.9	6.47	no	--	no	13
I241	MYTI EDU	SB	d.wt															6.4	6.21	2.3	6.49	5.59	4.45	2.93	no	--	no	15
I242	MYTI EDU	SB	d.wt															6.52	9.74	1.58	3.53	9.47	3.52	2.22	no	--	no	21
I243	MYTI EDU	SB	d.wt															7.47	6.12	1.72	5.43	5.11	4.01	1.99	no	--	no	18

Annual median concentration of DDEPP
(ppb)

																								ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR	LI	w.wt										163	440	182	159	191	194	312	383	260	230	160	180	no	--	no	13
36B	GADU MOR	LI	w.wt										91.9	51	50	75	55	105	141	129	45	86	47	46	no	--	no	14
15B	GADU MOR	LI	w.wt										50	136	48	57	86	33.5	75	140	72.5	76	46	60	no	--	no	16
53B	GADU MOR	LI	w.wt										637	806	939	85		42	491	936	490	160	380	260	1.3	--	no	25
67B	GADU MOR	LI	w.wt										776	554	347	392	471	109	460	2060	270	200	177	140	no	--	no	21
23B	GADU MOR	LI	w.wt										68	85.4	42	41	35	31	49	33	49	48	59	52.9	no	DY	no	10
92B	GADU MOR	LI	w.wt													53	50.5	50	196						no	-?	?	17
98B	GADU MOR	LI	w.wt												73	83.4	43	49	138	198	78	41	58	28	no	--	no	16
43B	GADU MOR	LI	w.wt														126	69	60						no	-?	?	9
10B	GADU MOR	LI	w.wt														211	71	75	99	65	90	32	38.5	no	--	no	14
30B	GADU MOR	MU	w.wt										0.45	1.21	2	1	0.32	0.29	0.97	1.04	1.5	1.5	0.44	0.67	no	--	no	19
36B	GADU MOR	MU	w.wt										0.34	0.29	0.2	0.5	0.09	0.93	0.58	0.88	0.31	0.32	0.171	0.24	no	--	no	19
15B	GADU MOR	MU	w.wt										0.47	0.36	0.346	0.2	0.12	0.26	0.35	0.514	0.23	0.32	0.31	0.19	no	--	no	13
53B	GADU MOR	MU	w.wt										2.36	2.16	6.75	1.8		0.08	4.09	4.59	4.64	3.2	2.5	0.6	no	--	no	>25
67B	GADU MOR	MU	w.wt										2.25	3.03	1.4	1	2.46	1.08	6.96	19	1	1.1	1.1	1.8	1.8	--	no	24
23B	GADU MOR	MU	w.wt										0.21	0.59	0.1	0.2	0.04	0.16	0.14	0.18	0.14	0.18	0.12	0.16	no	--	no	18
92B	GADU MOR	MU	w.wt													0.1	0.09	0.17	0.49						no	-?	?	14
98B	GADU MOR	MU	w.wt												0.4	0.4	0.06	0.05	0.24	0.6	0.18	0.15	0.4	0.38	no	--	no	23
43B	GADU MOR	MU	w.wt														0.23	0.23	0.14						no	-?	?	9
10B	GADU MOR	MU	w.wt														0.74	0.68	0.12	0.4	0.26	0.41	0.15	0.18	no	--	no	18

Annual median concentration of DDEPP
(ppb)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
33B	PLAT FLE	LI	w.wt										13	9.1	24	14	13	7	10.2	9.7	8.6	6.8	27	27	no	--	1.3	15
53B	PLAT FLE	LI	w.wt										94	70.1	32	41		8	25	45	38	44	17.5	39	1.3	--	no	17
67B	PLAT FLE	LI	w.wt																27		84.5	40	35	25	no	-?	?	17
33B	PLAT FLE	MU	w.wt										0.9	1.93	0.6	0.2	0.15	0.25	0.43	0.28	0.24	1.5	0.3	0.56	no	--	no	20
53B	PLAT FLE	MU	w.wt										4.67	5.3	3.8	1.3		0.373	1.79	1.36	0.96	0.93	0.61	0.88	no	D-	no	18
67B	PLAT FLE	MU	w.wt																0.85		1.31	1.4	1.2	0.54	no	-?	?	15
36F	LIMA LIM	LI	w.wt										28	34.4	28	21	50	40	40	22	18	52	45	27	no	--	no	14
15F	LIMA LIM	LI	w.wt											39		13.4	23.5	9	20.7	20	13	32		41	no	--	no	15
22F	LIMA LIM	LI	w.wt										68.9	48	39.9		21	9.17							no	D?	?	10
36F	LIMA LIM	MU	w.wt										0.41	1.15	0.7	0.5	0.96	0.91	0.91	0.46	0.67	0.49	0.52	0.51	no	--	no	13
15F	LIMA LIM	MU	w.wt											1.21		0.173	0.143	0.3	0.55	0.42	0.38	0.324		0.55	no	--	no	20
22F	LIMA LIM	MU	w.wt										1.1	2	1.18		0.56	0.83							no	-?	?	14
98F	LIMA LIM	MU	w.wt														0.57	0.31	1.63						no	-?	?	23
30F	PLEU PLA	LI	w.wt												21.2		13	12							1.2	-?	?	6
22F	PLEU PLA	LI	w.wt																7.8	12	2.8				no	-?	?	21
98F	PLEU PLA	LI	w.wt													3		8		15.5	6.2	7.8	10.8	8	no	--	no	16
10F	PLEU PLA	LI	w.wt																	15		34.7	28	8.9	no	-?	?	20
30F	PLEU PLA	MU	w.wt												0.693		0.32	0.17							no	-?	?	8
22F	PLEU PLA	MU	w.wt																0.47	0.34	0.76				no	-?	?	15
98F	PLEU PLA	MU	w.wt													0.1		0.46		0.302	0.21	0.14	0.465	0.24	no	--	no	19
10F	PLEU PLA	MU	w.wt																	0.4		0.859	1.1	0.3	no	-?	?	21
67B	LEPI WHI	LI	w.wt										294	240	183	163	250	145	143	167	160	160	130	58	m	D-	m	11
67B	LEPI WHI	MU	w.wt										2.56	1.51	2.5	0.8	0.8	3.04	0.78	1.27	0.56	1.4	1.1	0.54	m	--	m	17

Annual median concentration of HCB
(ppb)

																								ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30A	MYTI EDU	SB	d.wt				1.18	0.877	2.06	0.917	1.15	0.866	0.35	0.592	0.952	0.541	0.27	0.239	0.251	0.275	0.298		0.361	0.225	no	D-	no	14
31A	MYTI EDU	SB	d.wt			13.4	1.38	3.83	1.89	0.93	0.893	0.361	0.317	0.606	0.549	0.446	0.243	0.312	0.219	0.258	0.21		0.226	0.265	no	DY	no	16
35A	MYTI EDU	SB	d.wt			12.8	0.952	3.33	0.793	0.976	1.12	0.474	0.42	0.585	0.578	0.505	0.234	0.276	0.219	0.522	0.2	0.336	0.36	0.3	no	D-	no	17
36A	MYTI EDU	SB	d.wt			15	0.948	3.83	2.9	2.37	0.957	0.426	0.33	0.546	0.394	0.529	0.24	0.333	0.276	0.311	0.149		0.252	0.197	no	D-	no	18
71A	MYTI EDU	SB	d.wt			15.3	10.4	91.4	11.1	207	1.83	149	8.48	6.91	4.14	3.91	1.47	2.13	4.48	2.04	1.78	3.1	1.85	2.42	4.8	--	4.1	>25
													8.48	*6.91*	*4.14*	*3.91*	*1.47*	*2.13*	*4.48*	*2.04*	*1.78*	*3.1*	*1.85*	*2.42*	*4.8*	*D-*	*4.1*	*14*
76A	MYTI EDU	SB	d.wt										0.378	0.568	0.498	0.794			0.254	0.289	0.4	0.256	0.216	0.244	no	--	no	13
15A	MYTI EDU	SB	d.wt										0.203			0.488	0.253	0.217	0.294	0.254	0.159	0.224	0.179	0.253	no	--	no	12
51A	MYTI EDU	SB	d.wt															0.612	0.333	0.313	0.4	0.4	0.385	0.196	no	--	no	12
52A	MYTI EDU	SB	d.wt									0.855	0.378		0.813	0.811	0.276	0.316	0.262	0.333	0.214	0.334	0.199	0.376	no	--	no	14
56A	MYTI EDU	SB	d.wt								0.2	0.787	0.413	0.794	0.935	1.04	0.309	0.382	0.309	0.442	0.348	0.704	0.183	0.336	no	--	no	16
57A	MYTI EDU	SB	d.wt									0.769		0.763	0.719	0.794	0.357	0.301	0.262	0.431	0.576	0.625	0.262	0.361	no	--	no	13
63A	MYTI EDU	SB	d.wt									1.05		0.971	0.74	0.625	0.316	0.329	0.333	0.407	0.452	0.51	0.23	0.321	no	D-	no	11
65A	MYTI EDU	SB	d.wt								0.2	0.427	0.516	0.862	0.621	0.667	0.284	0.296	0.294	0.345	0.377	0.524	0.15	0.272	no	--	no	14
69A	MYTI EDU	SB	d.wt												0.532	0.526	0.286	0.251	0.286	0.5	0.483	0.361	0.207	0.331	no	--	no	12
22A	MYTI EDU	SB	d.wt										0.265	0.61	0.559	0.444	0.248	0.253	0.301	0.311	0.172	0.316	0.202	0.298	no	--	no	13
82A	MYTI EDU	SB	d.wt				2.26	10.7	0.656	0.617	0.8	0.535													1.1	--	no	24
84A	MYTI EDU	SB	d.wt				3.41	8.79	3.33	2.04	1.23	0.476		0.505	0.625	0.532		0.246	0.215						no	D-	no	15
92A	MYTI EDU	SB	d.wt												0.68	0.418	0.244	0.225	0.23	0.254					no	D-	no	12
98A	MYTI EDU	SB	d.wt												0.619	0.571				0.336	0.311	0.435	0.286	0.291	no	--	no	10
98X	MYTI EDU	SB	d.wt														0.559	0.318	0.26						no	-?	?	8
41A	MYTI EDU	SB	d.wt														0.292	0.263	0.291	0.303					no	-?	?	6
43A	MYTI EDU	SB	d.wt														0.325	0.338		0.45					no	-?	?	<=5
44A	MYTI EDU	SB	d.wt															0.273	0.286	0.329					no	-?	?	<=5
46A	MYTI EDU	SB	d.wt														0.263	0.291	0.273						no	-?	?	6
48A	MYTI EDU	SB	d.wt														0.279	0.294	0.238						no	-?	?	7
10A	MYTI EDU	SB	d.wt														0.292	0.266	0.245	0.309		0.284	0.278	0.289	no	--	no	6
11A	MYTI EDU	SB	d.wt														0.35	0.427	0.336	0.459					no	-?	?	8
11X	MYTI EDU	SB	d.wt																	0.34	0.208	0.249	0.242	0.253	no	-?	?	9

Annual median concentration of HCB (ppb)

																									ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
I021	MYTI EDU	SB	d.wt															0.833	0.916	0.48	0.375		0.481	0.636	1.3	--	2.0	13
I022	MYTI EDU	SB	d.wt															0.421	0.479	0.97	0.312	0.783	0.455	0.543	1.1	--	no	15
I023	MYTI EDU	SB	d.wt															0.482	0.424	0.431	0.259	0.615	0.347	0.342	no	--	no	12
I024	MYTI EDU	SB	d.wt															0.488	0.602	1.16	0.426	0.66	0.556	0.536	1.1	--	no	13
I301	MYTI EDU	SB	d.wt															0.294	0.284	0.695	0.818	1.55	0.508	0.677	1.4	--	1.7	16
I304	MYTI EDU	SB	d.wt															0.336	0.281	0.719	0.486		0.294	0.526	1.1	--	1.0	14
I306	MYTI EDU	SB	d.wt															0.299	0.307	0.774	0.253		0.296	0.294	no	--	no	15
I307	MYTI EDU	SB	d.wt															0.273	0.318	0.674	0.174		0.327	0.336	no	--	1.2	16
30A	MYTI EDU	SB	d.wt				1.18	0.877	2.06	0.917	1.15	0.866	0.35	0.592	0.952	0.541	0.27	0.239	0.251	0.275	0.298		0.361	0.225	no	D-	no	14
I711	MYTI EDU	SB	d.wt															4.45	5.54	0.575	4.46	6.96	2.56		5.1	--	1.8	25
I712	MYTI EDU	SB	d.wt															3.43	16.4	7.9	4.83	5	3.31	1.78	3.6	--	no	18
I131	MYTI EDU	SB	d.wt															0.316	0.298	0.273	0.196	0.582	0.288	0.327	no	--	no	13
I132	MYTI EDU	SB	d.wt															52.8	89.7	40.2	44.2	1.89	4.73	3.11	6.2	--	no	24
I133	MYTI EDU	SB	d.wt															18.1	43.5	8.12	28	1.7	6.18	2.3	4.6	--	no	24
51A	MYTI EDU	SB	d.wt															0.612	0.333	0.313	0.4	0.4	0.385	0.196	no	--	no	12
52A	MYTI EDU	SB	d.wt									0.855	0.378		0.813	0.811	0.276	0.316	0.262	0.333	0.214	0.334	0.199	0.376	no	--	no	14
I241	MYTI EDU	SB	d.wt															1.28	0.706	0.69	0.753	0.698	0.618	0.293	no	--	no	11
I242	MYTI EDU	SB	d.wt															1.2	0.923	0.562	0.604	0.651	0.552	0.241	no	D-	no	11
I243	MYTI EDU	SB	d.wt															1.03	0.663	0.516	1.24	0.662	0.67	0.262	no	--	no	15

Annual median concentration of HCB
(ppb)

																									ANALYSIS			
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR	LI	w.wt										10	17	7.48	16	11	11	12	7	5.3	5.1	9.1	8.9	no	--	no	12
36B	GADU MOR	LI	w.wt										7	9	9	10	9	5	9	6	4.4	6.5	5.4	4.6	no	--	no	10
15B	GADU MOR	LI	w.wt										5	20.5	10	14	14	9	11	13	11.5	11	6.2	6.6	no	--	no	13
53B	GADU MOR	LI	w.wt										10	10	16.5	7		5	7	7	5	4.7	12	2.1	no	--	no	17
67B	GADU MOR	LI	w.wt										14	8	7.94	8	8.49	10	8	15.5	9.9	4.6	5.63	4.9	no	--	no	12
23B	GADU MOR	LI	w.wt										6	9.49	12	9	8	6	10	6	8.4	7.8	7.6	9.25	no	--	no	10
92B	GADU MOR	LI	w.wt													17	11	14	13						no	-?	?	9
98B	GADU MOR	LI	w.wt												20	9.95	12	18	35	20.5	16	13	3.1	2.6	no	DY	no	15
43B	GADU MOR	LI	w.wt														15	16.5	13						no	-?	?	8
10B	GADU MOR	LI	w.wt														13	11	16	17	17	25	9	9.9	no	--	no	12
30B	GADU MOR	MU	w.wt										0.09	0.09	0.1	0.1	0.04	0.03	0.05	0.05	0.06	0.06	0.06	0.05	no	--	no	12
36B	GADU MOR	MU	w.wt										0.11	0.07	0.1	0.1	0.04	0.05	0.06	0.06	0.05	0.06	0.04	0.05	no	--	no	11
15B	GADU MOR	MU	w.wt										0.11	0.11	0.1	0.1	0.06	0.07	0.08	0.0748	0.1	0.06	0.1	0.04	no	--	no	11
53B	GADU MOR	MU	w.wt										0.1	0.03	0.1	0.1		0.03	0.0648	0.06	0.05	0.05	0.09	0.04	no	--	no	17
67B	GADU MOR	MU	w.wt										0.1	0.0849	0.1	0.1	0.0748	0.06	0.05	0.07	0.06	0.05	0.05	0.04	no	D-	no	8
23B	GADU MOR	MU	w.wt										0.08	0.08	0.1	0.1	0.04	0.06	0.06	0.06	0.06	0.06	0.06	0.06	no	--	no	10
92B	GADU MOR	MU	w.wt													0.1	0.07	0.05	0.09						no	-?	?	13
98B	GADU MOR	MU	w.wt												0.2	0.2	0.07	0.1	0.11	0.1	0.1	0.08	0.1	0.06	no	--	no	12
43B	GADU MOR	MU	w.wt														0.09	0.13	0.06						no	-?	?	15
10B	GADU MOR	MU	w.wt														0.16	0.11	0.09	0.2	0.17	0.26	0.09	0.11	no	--	no	14

Annual median concentration of HCB
(ppb)

St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	ANALYSIS OC	TRND	SM+3	PWR
33B	PLAT FLE	LI	w.wt										1	0.5	5	2	1	1	0.6	0.8	0.59	0.54	1.6	1.6	no	--	no	19
53B	PLAT FLE	LI	w.wt										6	4.47	5	2		1	2	3	1.8	2.5	2.39	2	no	--	no	14
67B	PLAT FLE	LI	w.wt																3		6.39	3.6	4.2	4.3	no	-?	?	12
33B	PLAT FLE	MU	w.wt										0.06	0.07	0.1	0.1	0.03	0.03	0.03	0.05	0.03	0.06	0.04	0.04	no	--	no	14
53B	PLAT FLE	MU	w.wt										0.45	0.3	0.2	0.1		0.0837	0.05	0.1	0.06	0.06	0.09	0.06	no	DY	no	11
67B	PLAT FLE	MU	w.wt																0.05		0.098	0.19	0.16	0.12	no	-?	?	14
36F	LIMA LIM	LI	w.wt										5.48	3	5	2	3	2	2.3	3	1.1	2.5	3	2.6	no	--	no	13
15F	LIMA LIM	LI	w.wt											4		4	4	2	3	3.2	3	3.64		5.9	no	--	no	10
22F	LIMA LIM	LI	w.wt										6	3	5		1	1.41							no	-?	?	15
36F	LIMA LIM	MU	w.wt										0.1	0.09	0.1	0.1	0.06	0.06	0.07	0.05	0.05	0.05	0.05	0.06	no	D-	no	8
15F	LIMA LIM	MU	w.wt											0.2		0.1	0.0447	0.07	0.09	0.07	0.09	0.08		0.15	no	--	no	14
22F	LIMA LIM	MU	w.wt										0.12	0.2	0.1		0.05	0.0742							no	-?	?	14
98F	LIMA LIM	MU	w.wt														0.07	0.13	0.16						no	-?	?	9
30F	PLEU PLA	LI	w.wt												5		2	2							no	-?	?	11
22F	PLEU PLA	LI	w.wt																0.5	0.9	0.3				no	-?	?	19
98F	PLEU PLA	LI	w.wt													1		1		1.74	1	2.5	1.3	1.8	no	--	no	13
10F	PLEU PLA	LI	w.wt																	6.1		8.77	6.4	2.4	no	-?	?	17
30F	PLEU PLA	MU	w.wt												0.141		0.05	0.03							no	D?	?	<=5
22F	PLEU PLA	MU	w.wt																0.03	0.03	0.04				no	-?	?	7
98F	PLEU PLA	MU	w.wt													0.1		0.13		0.0548	0.04	0.07	0.07	0.04	no	--	no	14
10F	PLEU PLA	MU	w.wt																	0.22		0.303	0.49	0.15	1.5	-?	?	18
67B	LEPI WHI	LI	w.wt										9	4	5	4	5	2	4.6	4	5	2.8	4.8	3.4	m	--	m	13
67B	LEPI WHI	MU	w.wt										0.09	0.07	0.1	0.1	0.03	0.04	0.03	0.07	0.03	0.04	0.05	0.03	m	--	m	14

Annual median concentration of BAP
(ppb)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
I301	MYTI EDU	SB	d.wt															4.44	19.3	18.8	6.02	13.1	2.55	9.77	2.0	--	no	22
I304	MYTI EDU	SB	d.wt															3.36	2.81	3.29	3.38	2.76	2.94	3.76	no	--	no	7
I306	MYTI EDU	SB	d.wt															2.99	3.07	2.87	3.05	3.07	2.96	2.94	no	--	no	<=5
I307	MYTI EDU	SB	d.wt															2.73	3.21	2.75	2.91	3.01	3.27	3.36	no	--	no	6
30A	MYTI EDU	SB	d.wt												2.53			3.35	3.52	4.95	3.57	2.99	2.99	3.29	no	--	no	9
I131	MYTI EDU	SB	d.wt															3.25	2.66	2.73	3.6	5.02	2.4	3.27	no	--	no	11
I132	MYTI EDU	SB	d.wt															71.8	89	18.6	22.6	300	10.8	32.7	6.5	--	4.2	>25
I133	MYTI EDU	SB	d.wt															80.6	13.7	51.7	18.6		8.47	19	3.8	--	3.3	20
I201	MYTI EDU	SB	d.wt															93.2	207	679	10.5	83.8	47.4	31.7	6.3	--	no	>25
I205	MYTI EDU	SB	d.wt															7.39		23.1	64.5	7.51	5.59	7.55	1.5	--	1.4	25
I912	MYTI EDU	SB	d.wt															7.02		9.46	5.35	16.4	135	4.17	no	--	5.4	>25
I962	MYTI EDU	SB	d.wt															246	33.5		87				17.4	-?	?	>25
I969	MYTI EDU	SB	d.wt															14.2	10.7	17.6	8.42	10.3	17.1	23.5	4.7	--	5.2	12

Annual median concentration of PK_S
(ppb)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
I301	MYTI EDU	SB	d.wt															125	959	197	106	183	43.4	114	2.3	--	no	24
I304	MYTI EDU	SB	d.wt															21.1	77.4	13.7	38.4	38.4	9.15	23.3	no	--	no	21
I306	MYTI EDU	SB	d.wt															22.2	172	34.8	32.8	32.2	8.88	29.6	no	--	no	23
I307	MYTI EDU	SB	d.wt															18.2	106	19.9	29.3	48.5	13.4	28.9	no	--	no	21
30A	MYTI EDU	SB	d.wt												38.1			27.5	132	46	40	21.9	19.5	39.4	no	--	no	18
I131	MYTI EDU	SB	d.wt															70.8	50.9	35.4	63.1	60.3	40.9	29.8	no	--	no	12
I132	MYTI EDU	SB	d.wt															759	855	281	593	2730	258	390	7.8	--	6.3	24
I133	MYTI EDU	SB	d.wt															1950	335	647	292		161	341	6.8	--	7.3	19
I201	MYTI EDU	SB	d.wt															768	1650	7970	284	1020	938	640	12.8	--	1.4	>25
I205	MYTI EDU	SB	d.wt															124		470	1390	205	197	190	3.8	--	3.4	24
I912	MYTI EDU	SB	d.wt															237		342	208	210	1590	72.6	1.5	--	7.0	>25
I962	MYTI EDU	SB	d.wt															2420	479		682				13.6	-?	?	24
I969	MYTI EDU	SB	d.wt															221	169	230	139	287	198	171	3.4	--	3.8	11

Annual median concentration of PAHSS
(ppb)

																									ANALYSIS		
St	Species	Tsu	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
I301	MYTI EDU	SB	d.wt															726	3420	2100	830	1250	571	795	3.2	--	no	19
I304	MYTI EDU	SB	d.wt															103	256	208	267	405	77.1	201	no	--	no	18
I306	MYTI EDU	SB	d.wt															100	507	228	205	296	73.1	139	no	--	no	19
I307	MYTI EDU	SB	d.wt															83.7	275	177	182	421	82.4	168	no	--	no	19
30A	MYTI EDU	SB	d.wt												248			236	616	524	324	262	162	150	no	--	no	13
I131	MYTI EDU	SB	d.wt															207	255	191	265	360	282	118	no	--	no	13
I132	MYTI EDU	SB	d.wt															2760	2810	1390	1730	7270	1380	1170	4.7	--	4.1	20
I133	MYTI EDU	SB	d.wt															5690	1770	1960	1150		1080	964	3.9	D-	2.8	14
I201	MYTI EDU	SB	d.wt															2660	5210	17100	861	3720	2560	1300	5.2	--	no	25
I205	MYTI EDU	SB	d.wt															614		1770	3540	891	658	509	2.0	--	no	21
I912	MYTI EDU	SB	d.wt															1100		1530	963	1970	7300	832	3.3	--	4.4	22
I962	MYTI EDU	SB	d.wt															6340	1690		1850				7.4	-?	?	20
I969	MYTI EDU	SB	d.wt															1060	986	747	629	917	1160	824	3.3	--	4.2	10

Annual median concentration of OH-PYRENE (ug/kg/ABS 380nm)

																										ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR	BI	w.wt																		115	130	12.3	17	m	-?	m	22
36B	GADU MOR	BI	w.wt																		42.9	28.9	5.14	3.72	m	D?	m	15
15B	GADU MOR	BI	w.wt																		3770	253		29.7	m	-?	m	23
53B	GADU MOR	BI	w.wt																		83	58.6	9.23	3.81	m	D?	m	15
67B	GADU MOR	BI	w.wt																		19.8	16.5	1.62	1.66	m	-?	m	20
23B	GADU MOR	BI	w.wt																		12.7	11.2	4.15	2.55	m	D?	m	11
53B	PLAT FLE	BI	w.wt																			74.6	9.75	3.64	m	-?	m	15
67B	PLAT FLE	BI	w.wt																			41	1.71	5.42	m	-?	m	>25
36F	LIMA LIM	BI	w.wt																			48.8	4.18	3.48	m	-?	m	23

Annual median concentration of ALAD (ng PBG/min/mg prot.)

																										ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR	BL	w.wt																	8.98	15.6	13	14.6	12.7	m	-?	m	10
36B	GADU MOR	BL	w.wt																	13	26.2	9.93	22	19.4	m	-?	m	15
15B	GADU MOR	BL	w.wt																	17.2	23.4	8.45		18.9	m	-?	m	17
53B	GADU MOR	BL	w.wt																	7.64	10.1	11.1	12.7	10	m	-?	m	8
67B	GADU MOR	BL	w.wt																	7.17	28.2	16.9	22.4	19	m	-?	m	16
23B	GADU MOR	BL	w.wt																	15.8	24.8	18.1	19.8	24	m	-?	m	9
53B	PLAT FLE	BL	w.wt																			10.4	8.82	7.61	m	D?	m	<=5
67B	PLAT FLE	BL	w.wt																			15.9	17.6	23.6	m	-?	m	6
36F	LIMA LIM	BL	w.wt																			7.89	17.6	15	m	-?	m	14

Annual median concentration of EROD (pmol/min/mg prot.)

																										ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR	LI	w.wt																	68.8	109	70	260	81.2	m	-?	m	18
36B	GADU MOR	LI	w.wt																	95.1	14.2	62.1	64.9	79.5	m	-?	m	22
15B	GADU MOR	LI	w.wt																	49.9	52.3	184		64.4	m	-?	m	20
53B	GADU MOR	LI	w.wt																	86.5	119	90.1	133	37.4	m	-?	m	16
67B	GADU MOR	LI	w.wt																	103	76.2	84.5	103	72.9	m	-?	m	9
23B	GADU MOR	LI	w.wt																	94.1	28.6	71	73.5	77.1	m	-?	m	16
53B	PLAT FLE	LI	w.wt																			24.6	6.22	33.8	m	-?	m	>25
67B	PLAT FLE	LI	w.wt																			16.1	7.3	6.38	m	-?	m	11
36F	LIMA LIM	LI	w.wt																			471	336	149	m	-?	m	9

Annual median concentration of MT (ug/mg prot.)

																										ANALYSIS		
St	Species	Tissue	Base	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	OC	TRND	SM+3	PWR
30B	GADU MOR	LI	w.wt																	14.2	16.2	18.3	8.02	11.6	m	-?	m	12
36B	GADU MOR	LI	w.wt																	17.9	16.8	26.3	11.6	9.82	m	-?	m	13
15B	GADU MOR	LI	w.wt																	13.3	19.5	17.8		15	m	-?	m	10
53B	GADU MOR	LI	w.wt																	17.1	21.4	20.3	11.7	15.7	m	-?	m	10
67B	GADU MOR	LI	w.wt																	16.9	21.5	16.8	16.3	12.8	m	-?	m	8
23B	GADU MOR	LI	w.wt																	12.9	21.5	23.5	14.3	17	m	-?	m	12
53B	PLAT FLE	LI	w.wt																			15	8.33	18.3	m	-?	m	17
67B	PLAT FLE	LI	w.wt																			34.1	27.3	29	m	-?	m	7
36F	LIMA LIM	LI	w.wt																			13.7	9.83	8.13	m	-?	m	<=5

Appendix I
Geographical distribution of contaminants and biomarkers in biota 2000-2001

Sorted by contaminant and species:

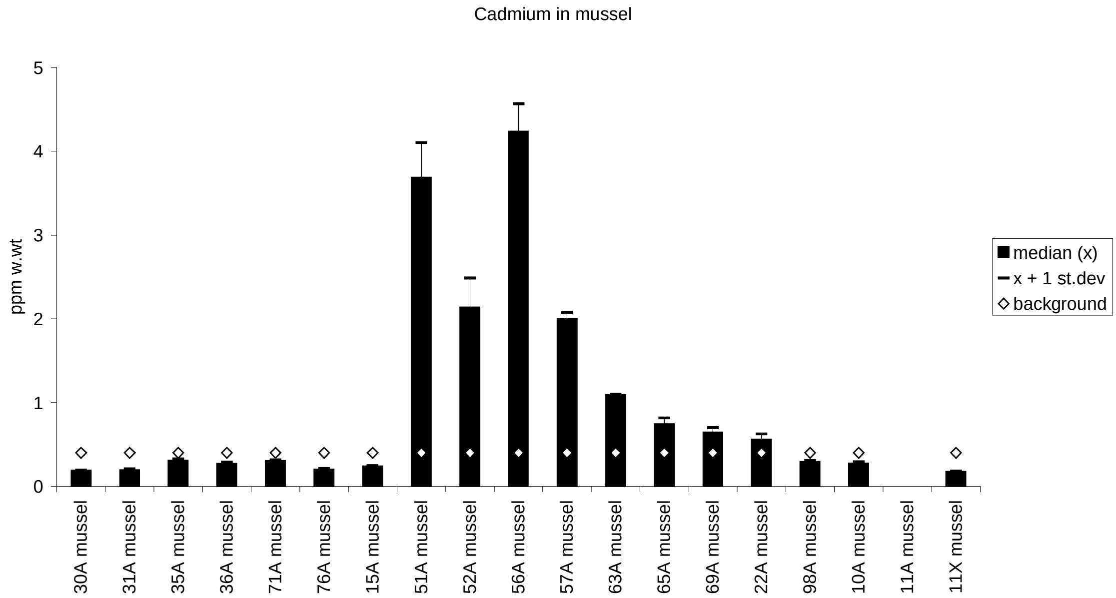
Cadmium (Cd)
Mercury (Hg)
Lead (Pb)
Sum of 7 CBs (CB-28, -52, 101, -118, -138, -153 and -180)
DDEPP (ppDDE)
HCB
OH-pyrene
ALA-D (δ-amino levulinic acid dehydrase inhibition)
EROD (Cytochrome P4501A-activity)
MT (Metallothionein)

MYTI EDU - Blue Mussel (*Mytilus edulis***)**
GADU MOR - Atlantic cod (*Gadus morhua***)**
PLAT FLE - Flounder (*Platichthys flesus***)**
LIMA LIM - Dab (*Limanda limanda***)**
PLEU PLA - Plaice (*Pleuronectes platessa***)**
MICR KIT - Lemon sole (*Microstomus kitt***)**
LEPI WHI - Megrim (*Lepidorhombus whiff-iagonis***)**

Station positions are shown on maps in Appendix F

Appendix I
Geographical distribution of contaminants and biomarkers in biota 2000-2001
(cont.)

A



B

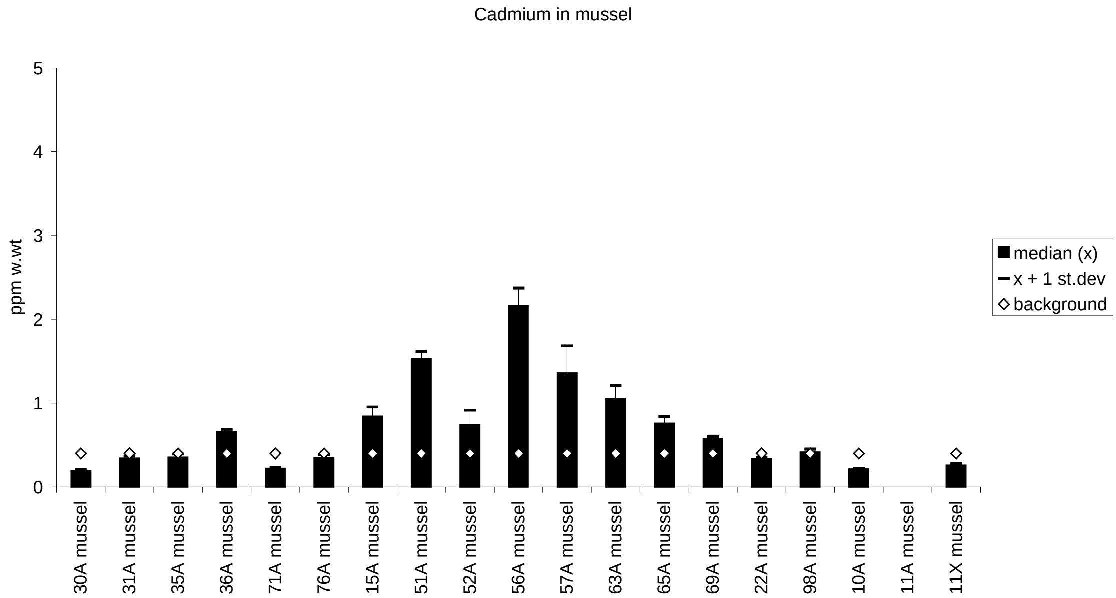
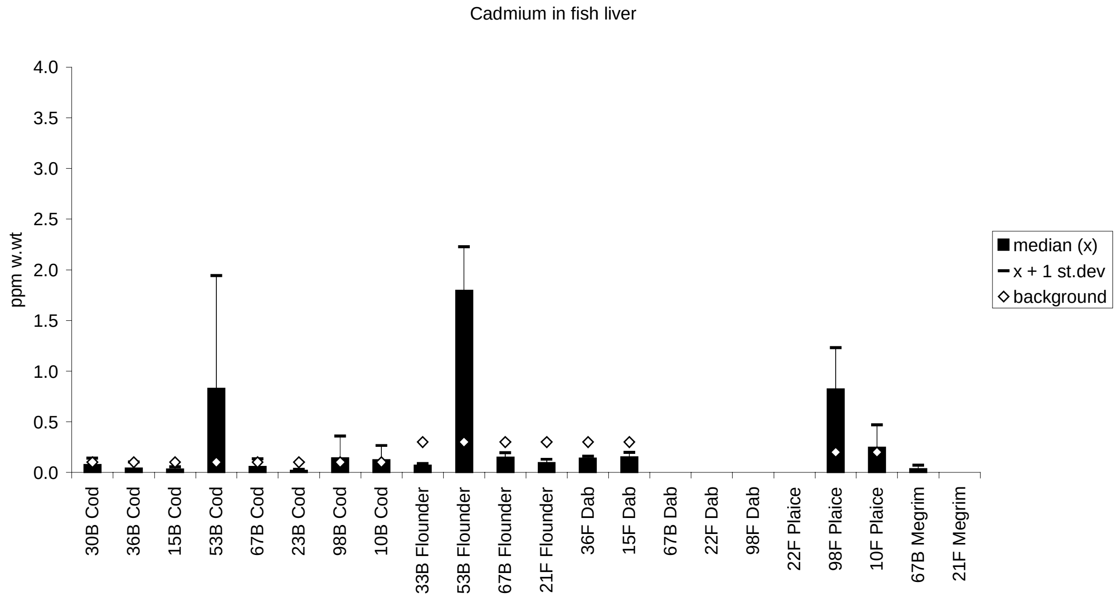


Figure 23. Median, standard deviation and provisional "high background" concentration for cadmium in mussels (*Mytilus edulis*) 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F).

A



B

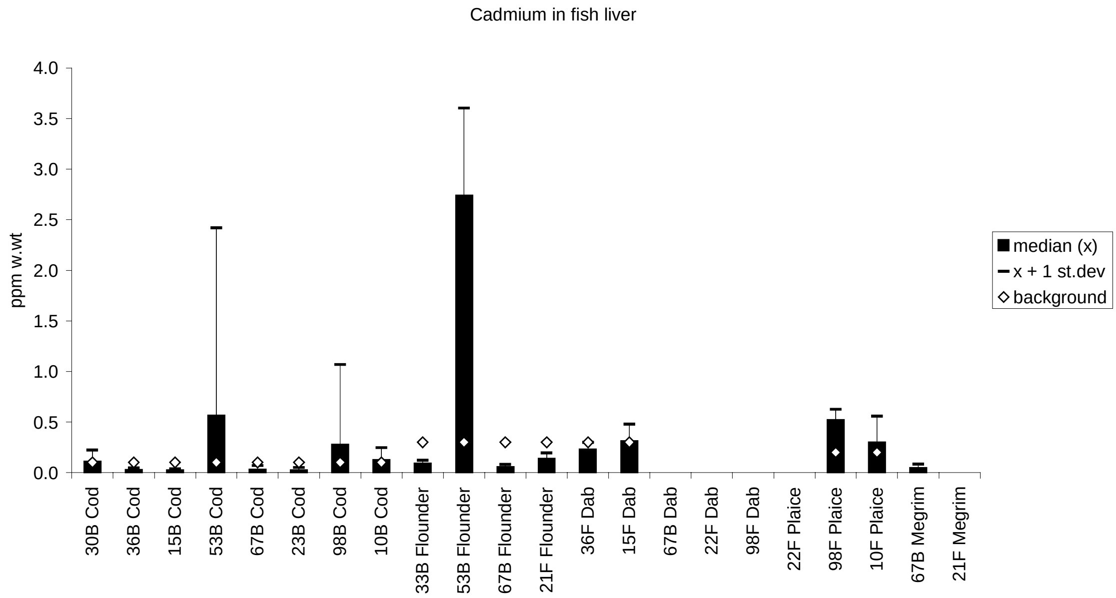


Figure 24. Median, standard deviation and provisional "high background" concentration for cadmium in fish liver 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F).

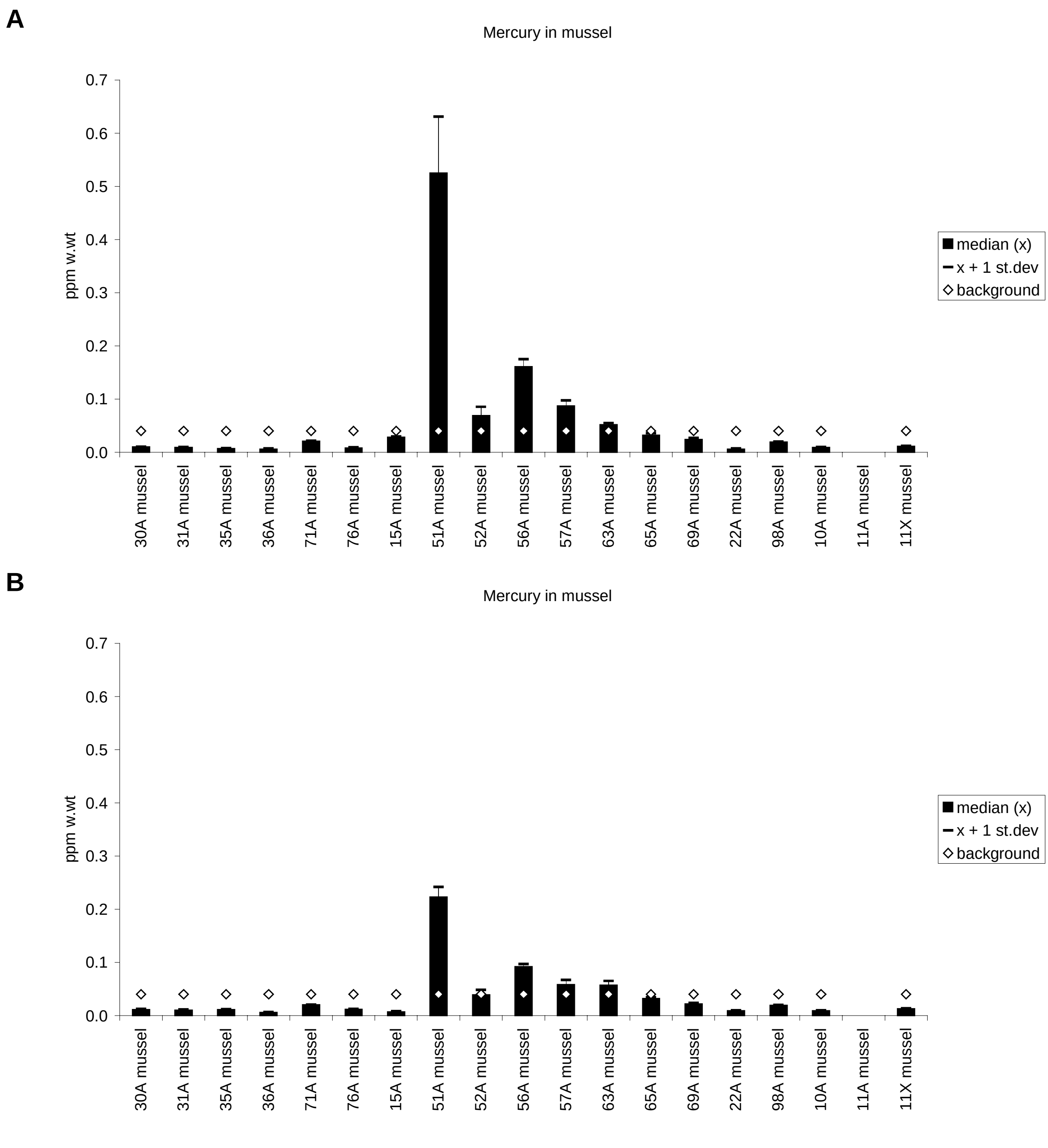
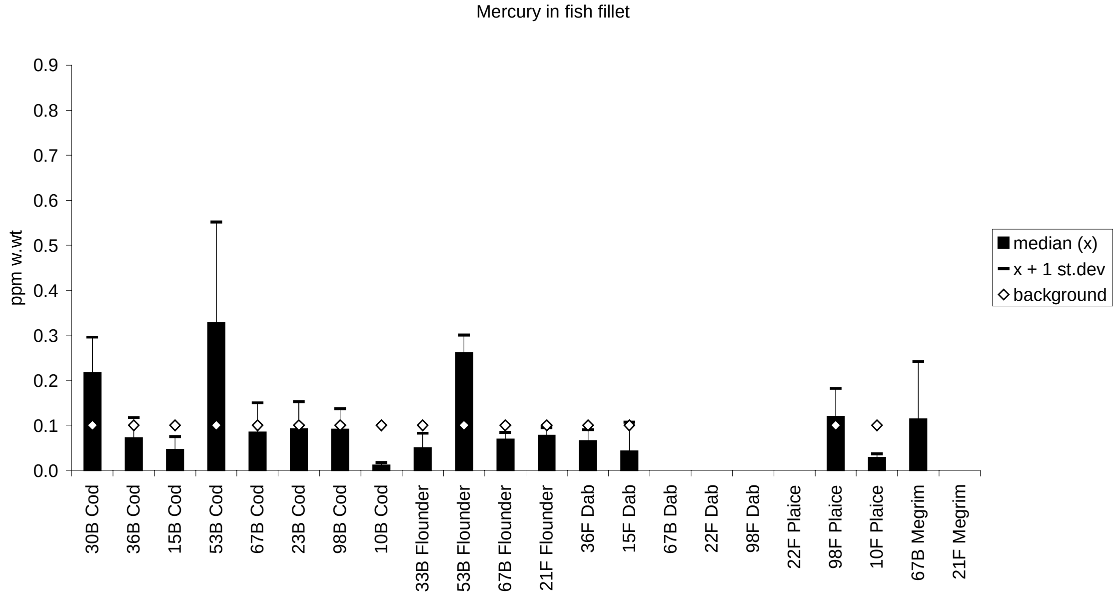


Figure 25. Median, standard deviation and provisional "high background" concentration for mercury in mussels (*Mytilus edulis*) 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F).

A



B

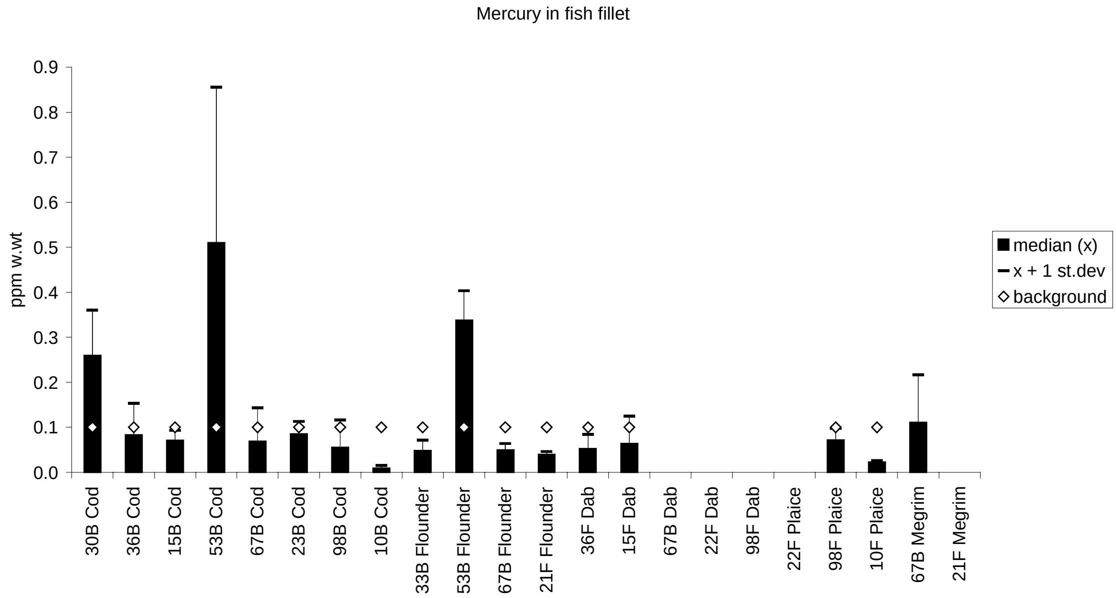
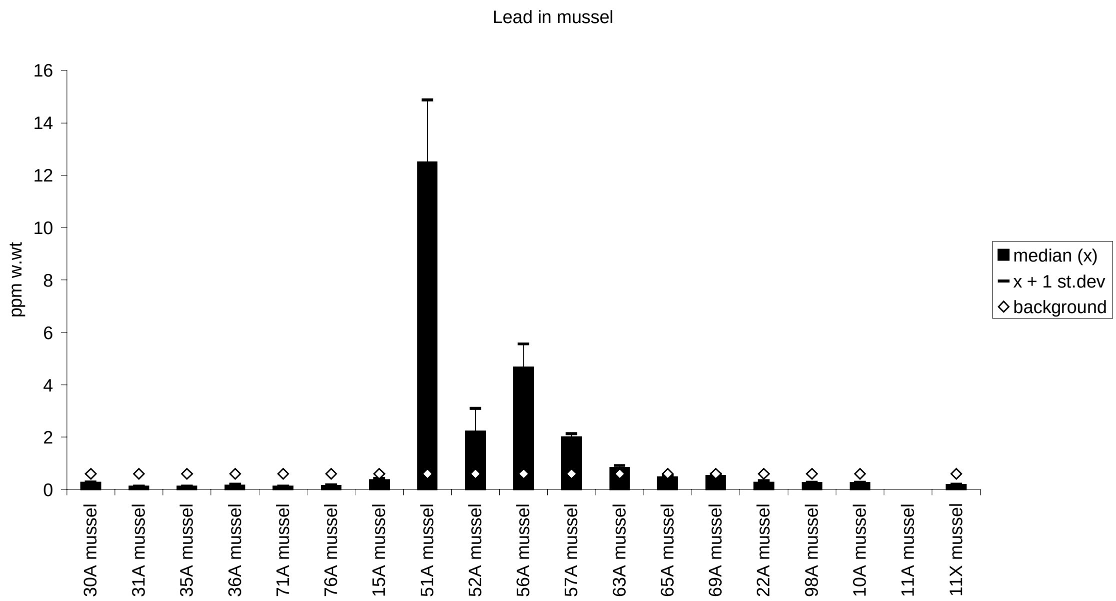


Figure 26. Median, standard deviation and provisional "high background" concentration for mercury in fish fillet 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F).

A



B

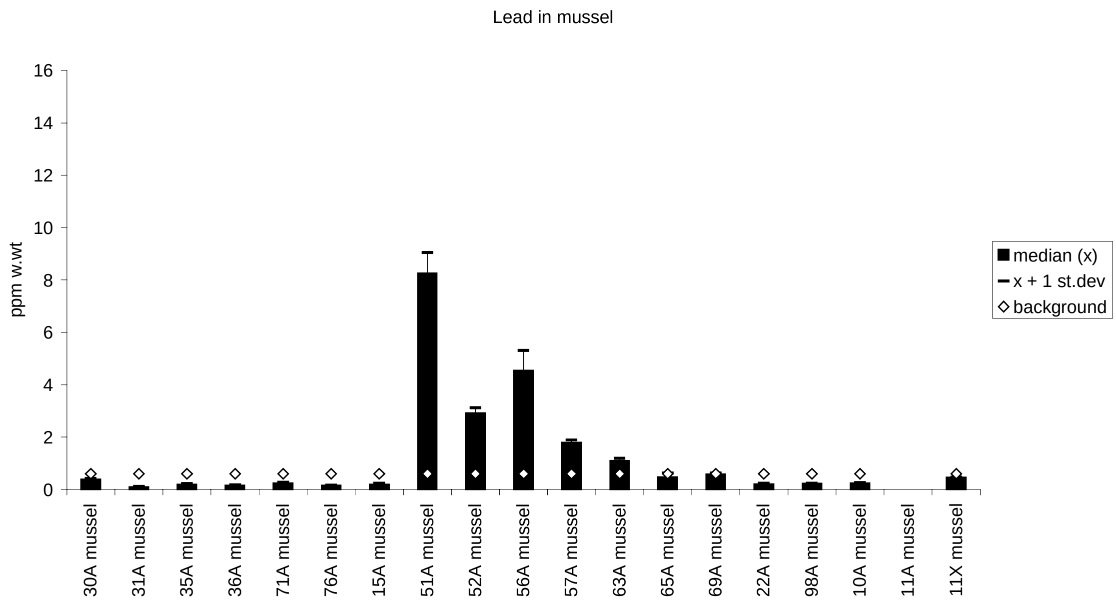
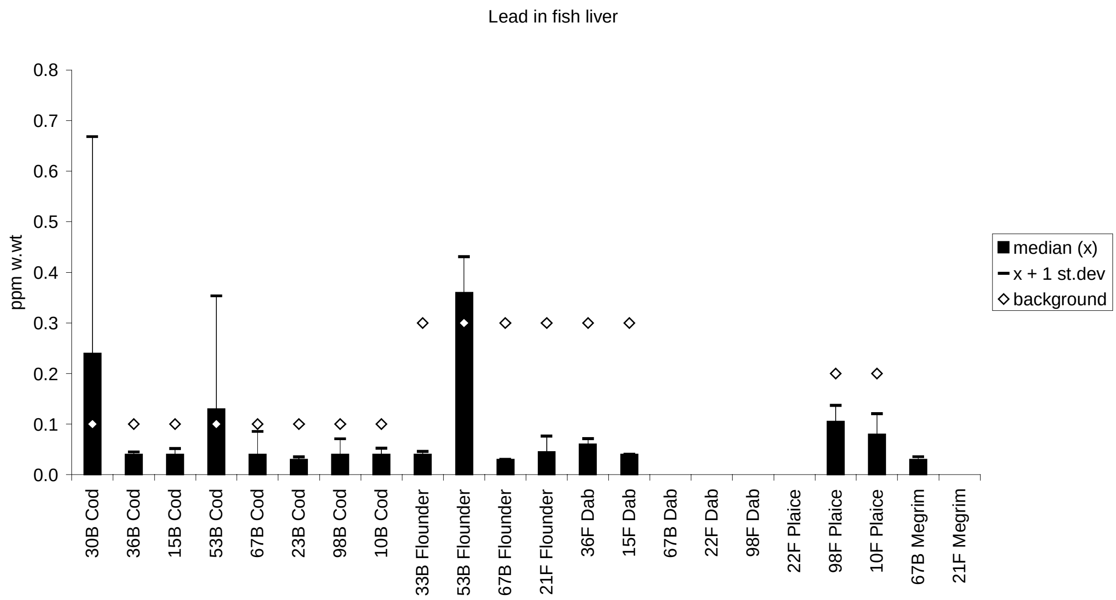


Figure 27. Median, standard deviation and provisional "high background" concentration for lead in mussels (*Mytilus edulis*) 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F).

A



B

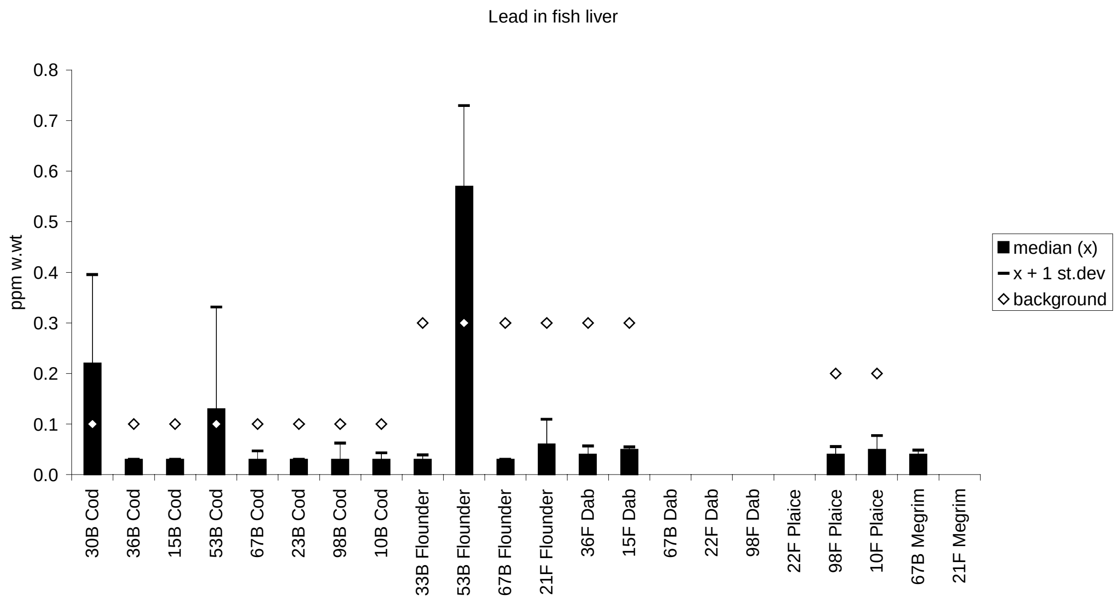
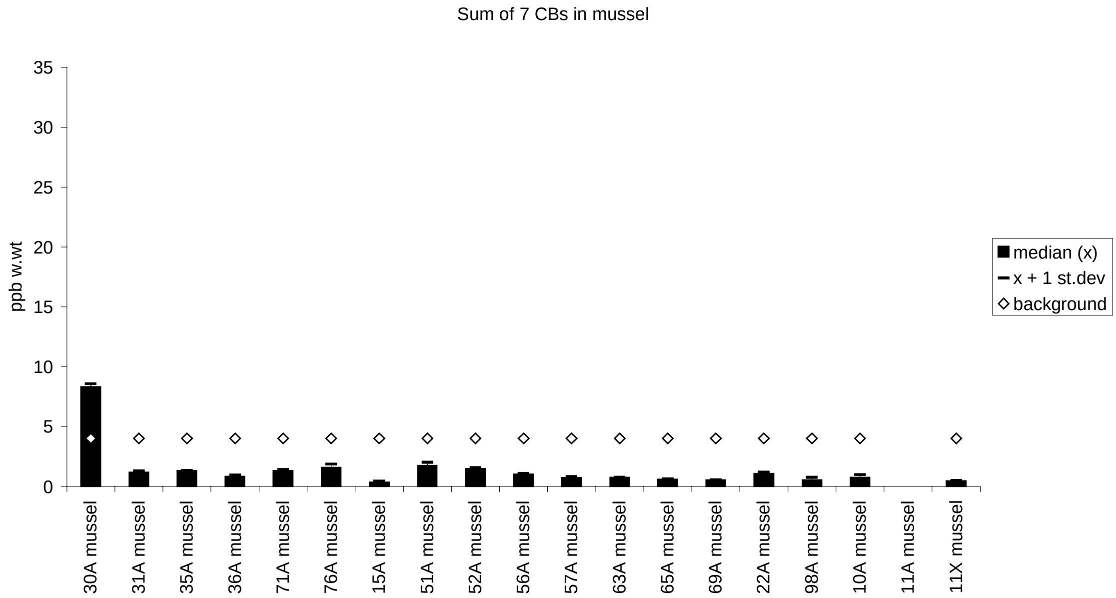


Figure 28. Median, standard deviation and provisional "high background" concentration for lead in fish liver 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F).

A



B

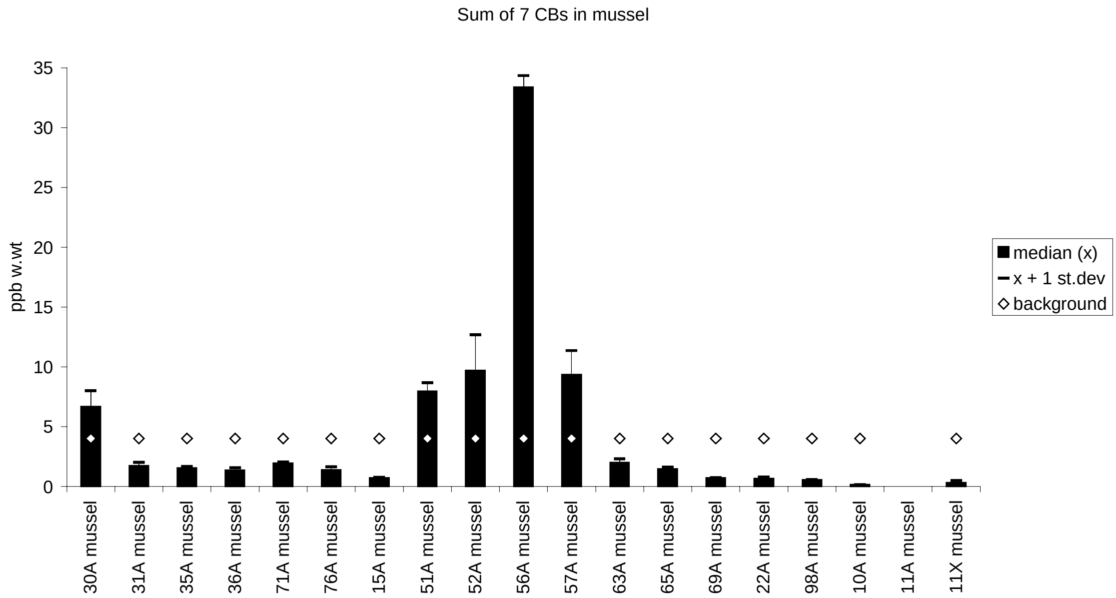
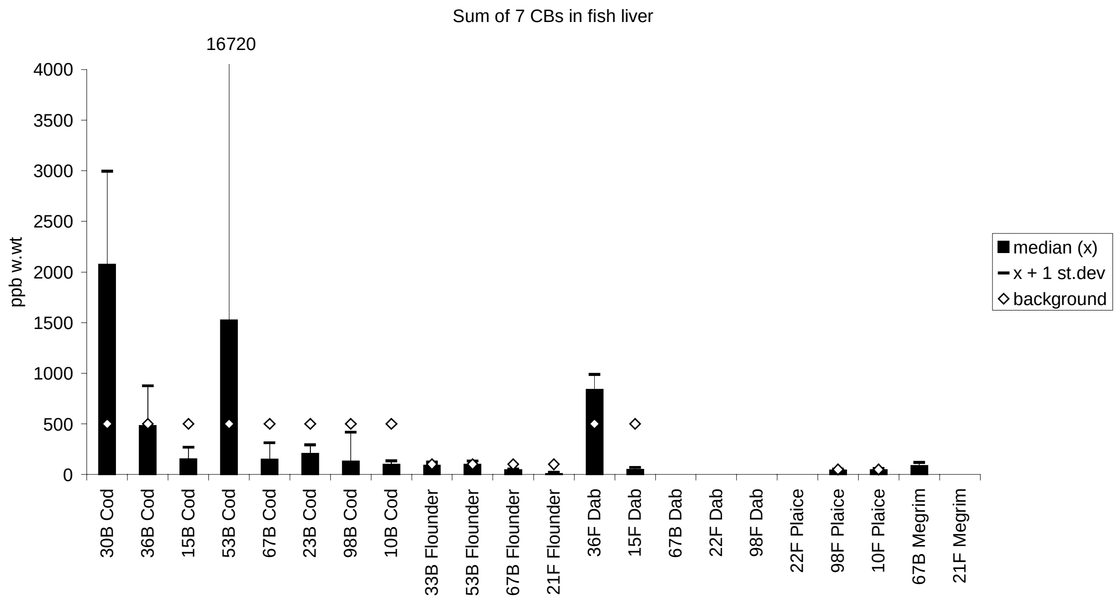


Figure 29. Median, standard deviation and provisional "high background" concentration for sum of 7 PCBs (CB-28, -52, 101, -118, -138, -153 and -180) in mussels (*Mytilus edulis*) 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F).

A



B

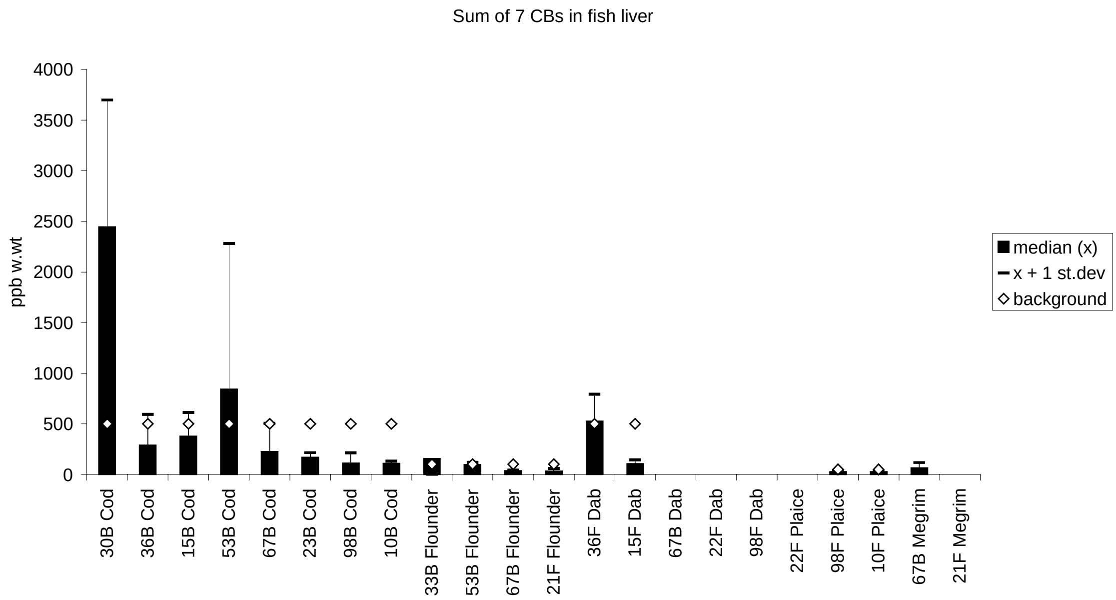
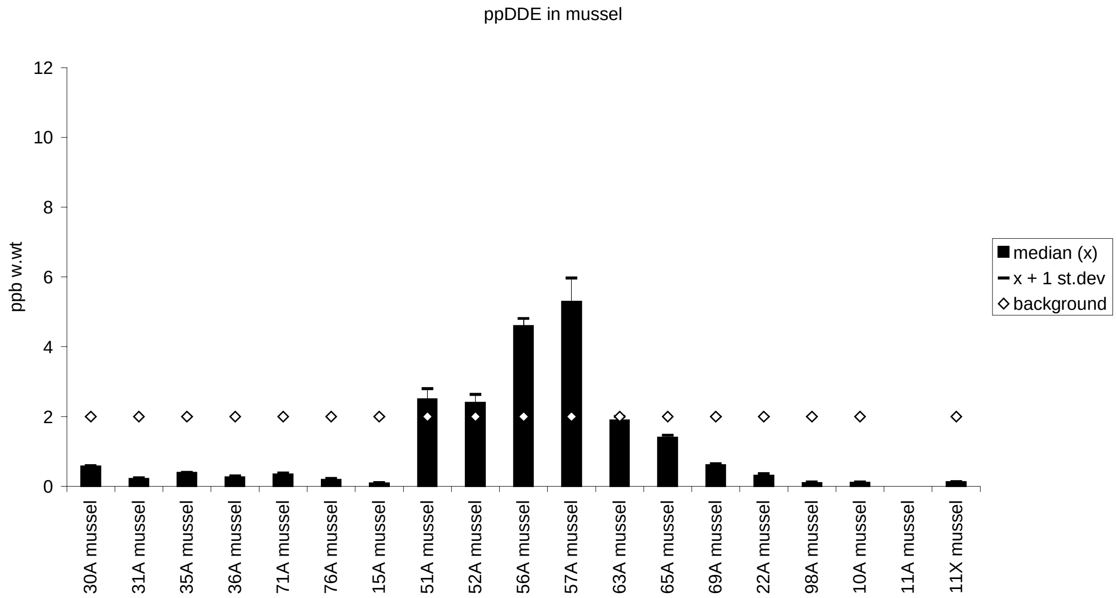


Figure 30. Median, standard deviation and provisional "high background" concentration for sum of 7 PCBs (CB-28, -52, 101, -118, -138, -153 and -180) in fish liver 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F).

A



B

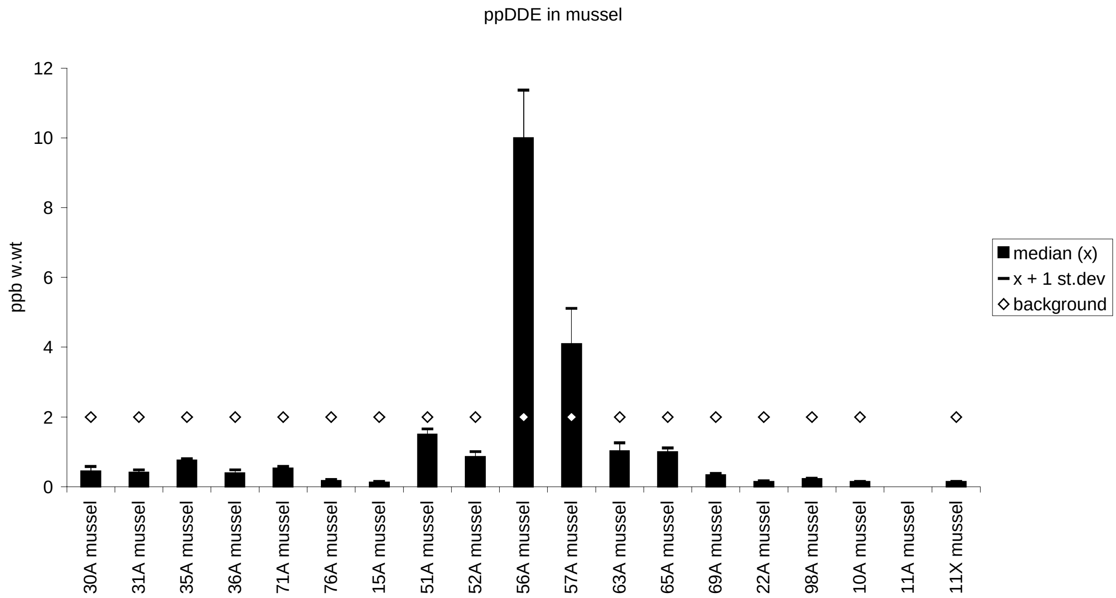
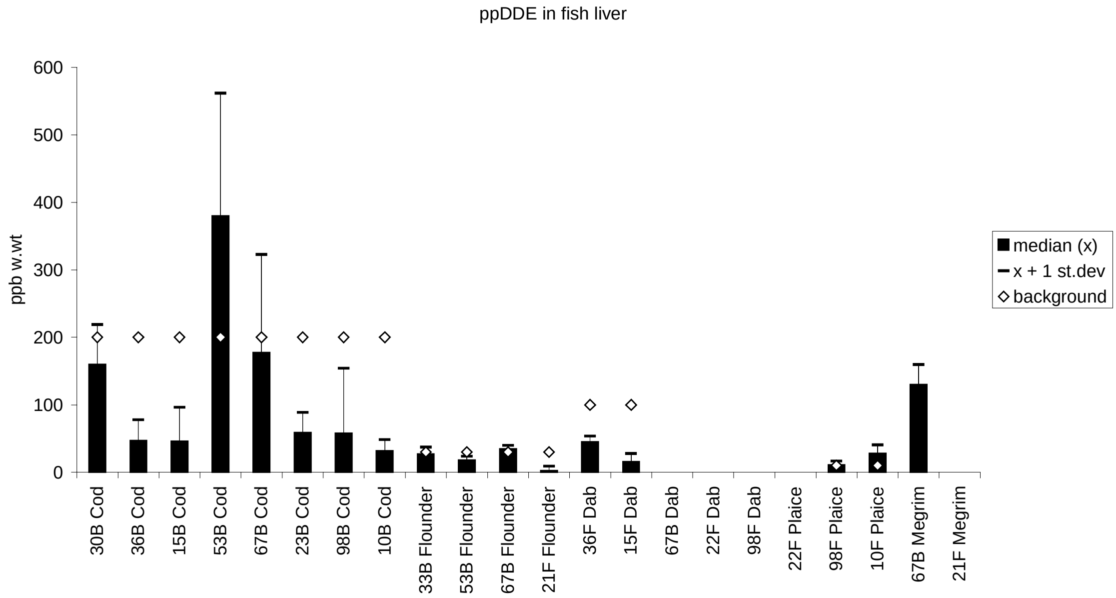


Figure 31. Median, standard deviation and provisional "high background" concentration for ppDDE (DDEPP) in mussels (*Mytilus edulis*) 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F). (See also footnote in Table 7).

A



B

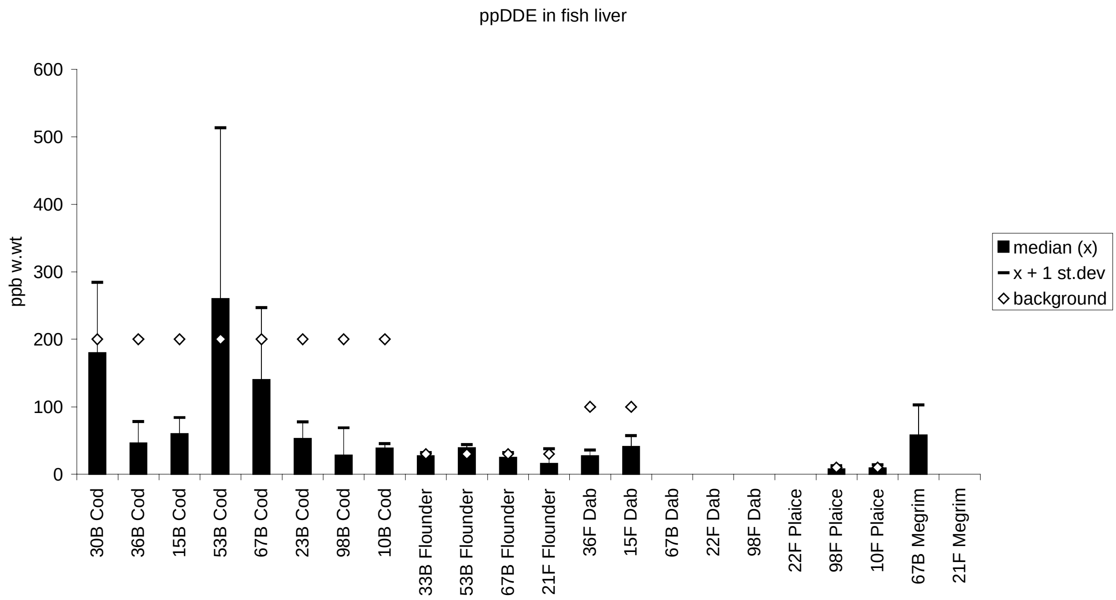
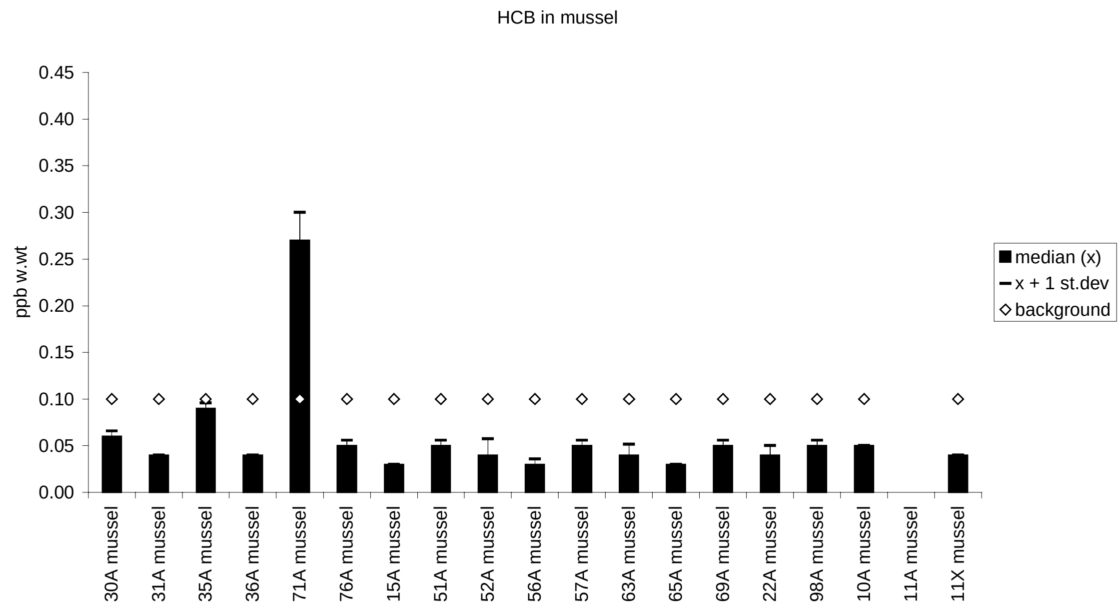


Figure 32. Median, standard deviation and provisional "high background" concentration for ppDDE (DDEPP) in fish liver 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F). (See also footnote in Table 7).

A



B

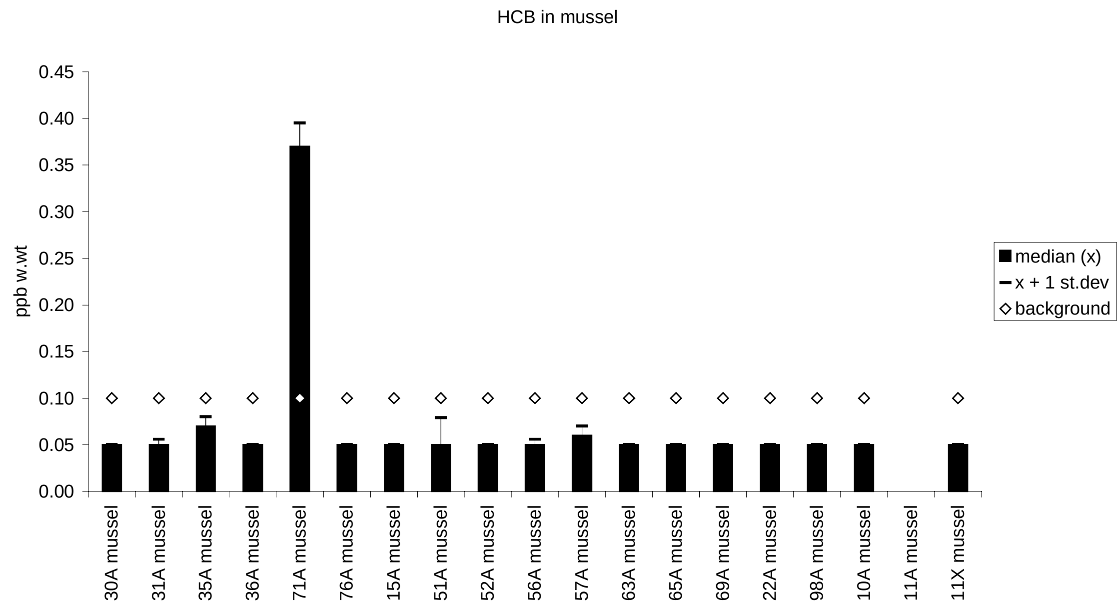
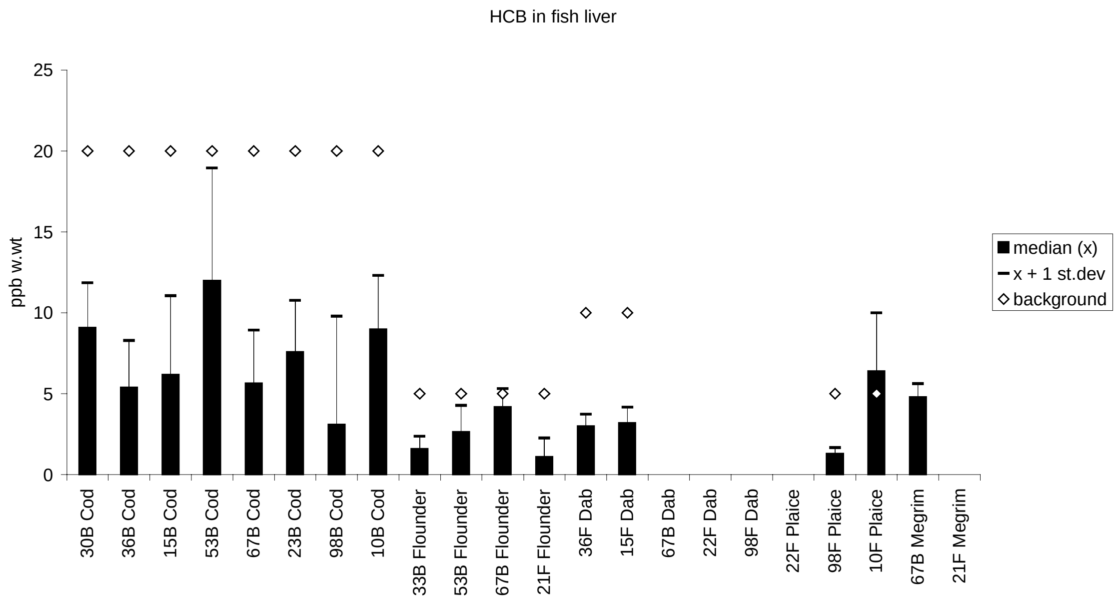


Figure 33. Median, standard deviation and provisional "high background" concentration for HCB in mussels (*Mytilus edulis*) 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F).

A



B

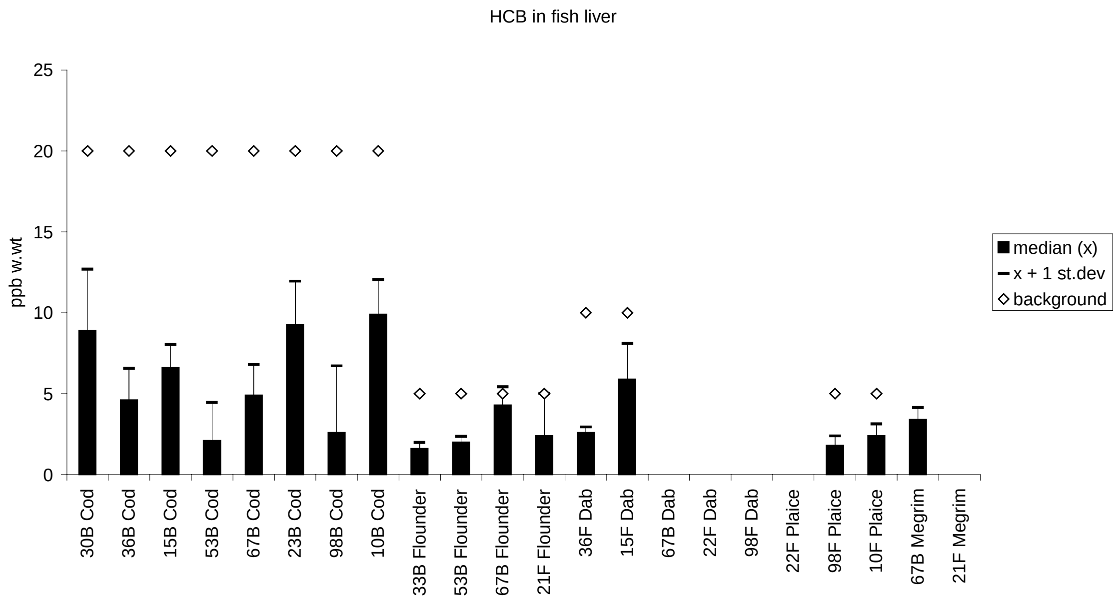
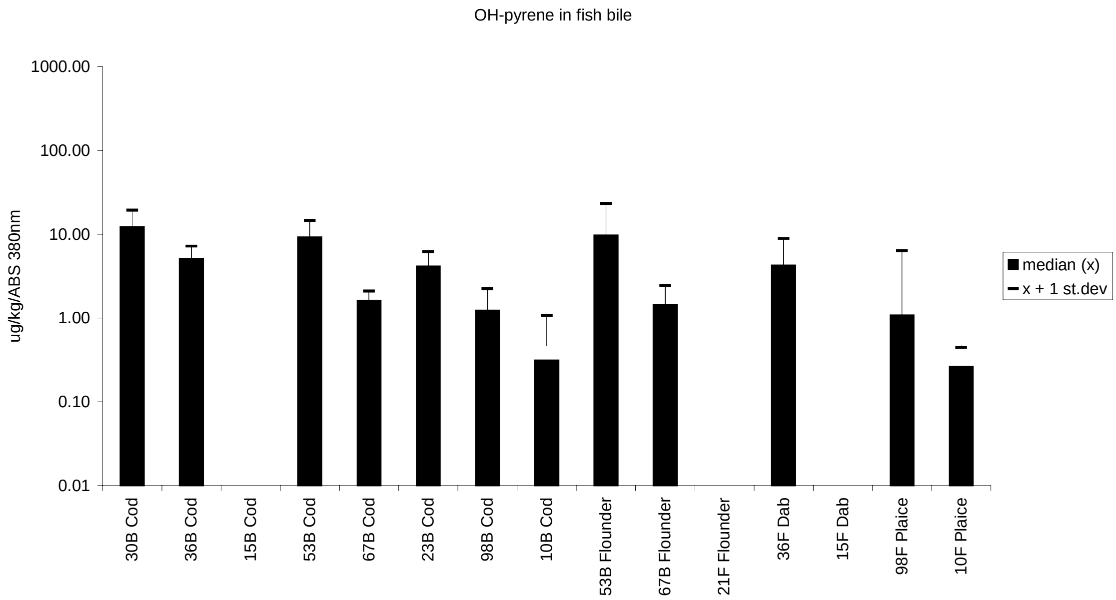


Figure 34. Median, standard deviation and provisional "high background" concentration for HCB in fish liver 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F).

A



B

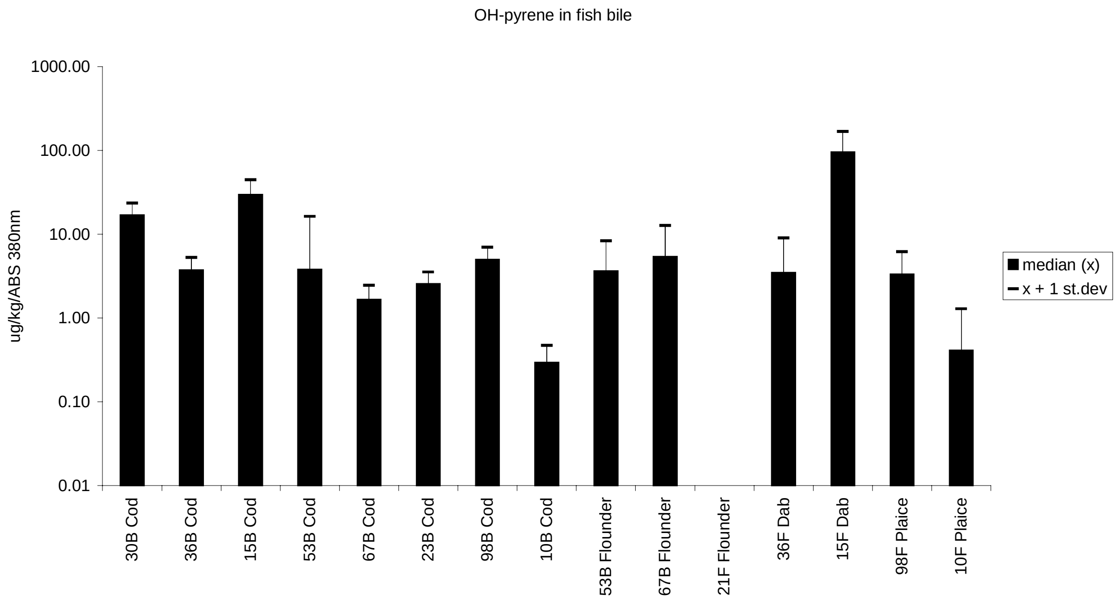
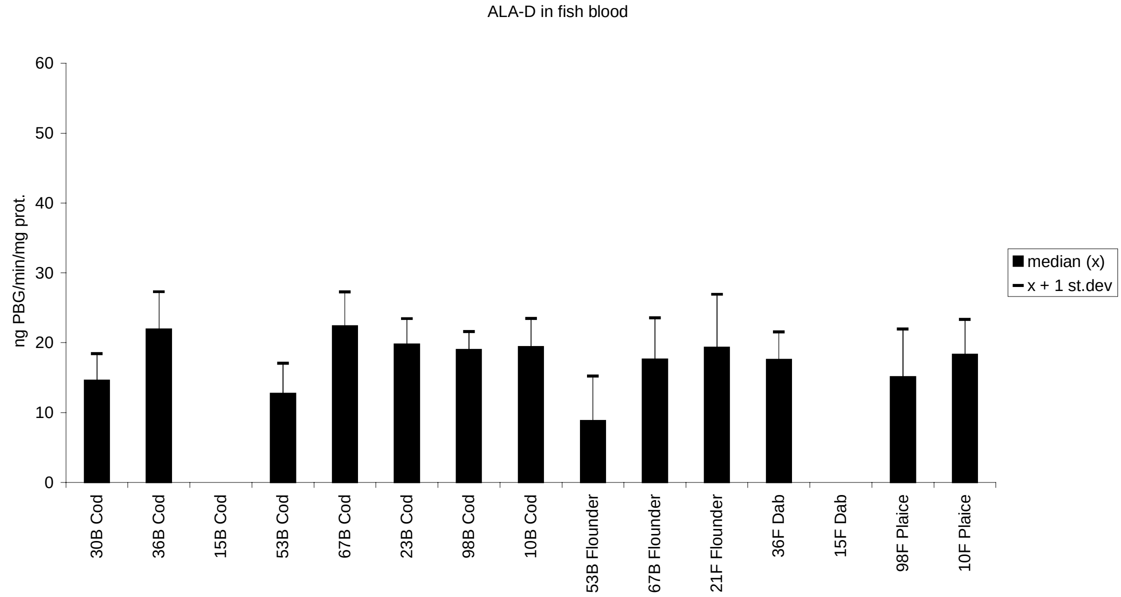


Figure 35. Median and standard deviation concentration for OH-pyrene (Pyrene metabolite) in fish bile 2000 (**A**) and 2001 (**B**), µg/kg/ABS (absorbance) 380 nm (see maps in Appendix F).

A



B

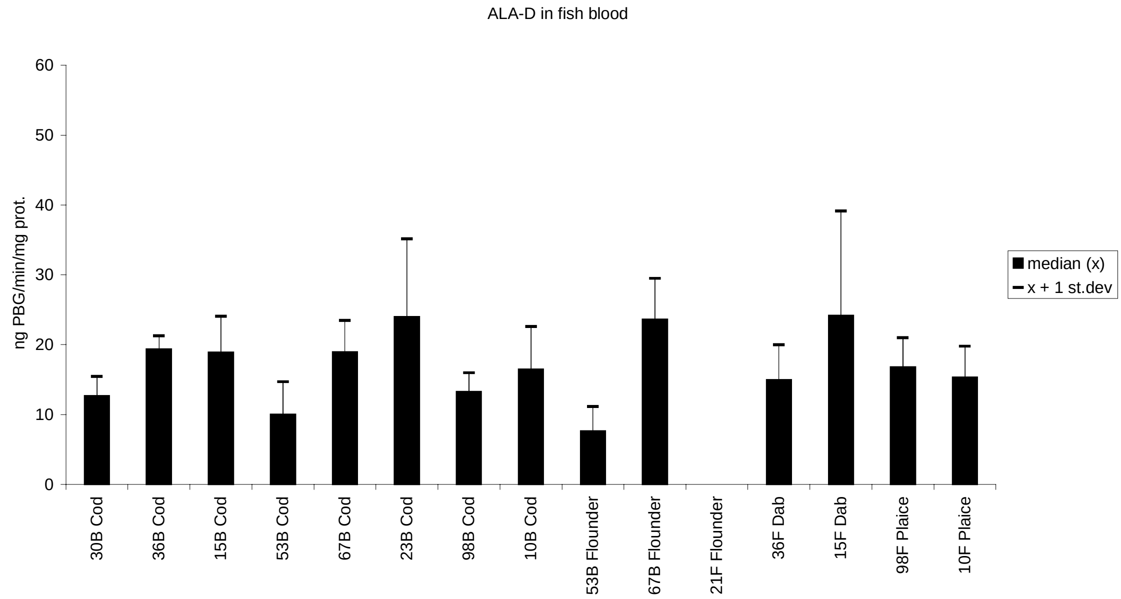
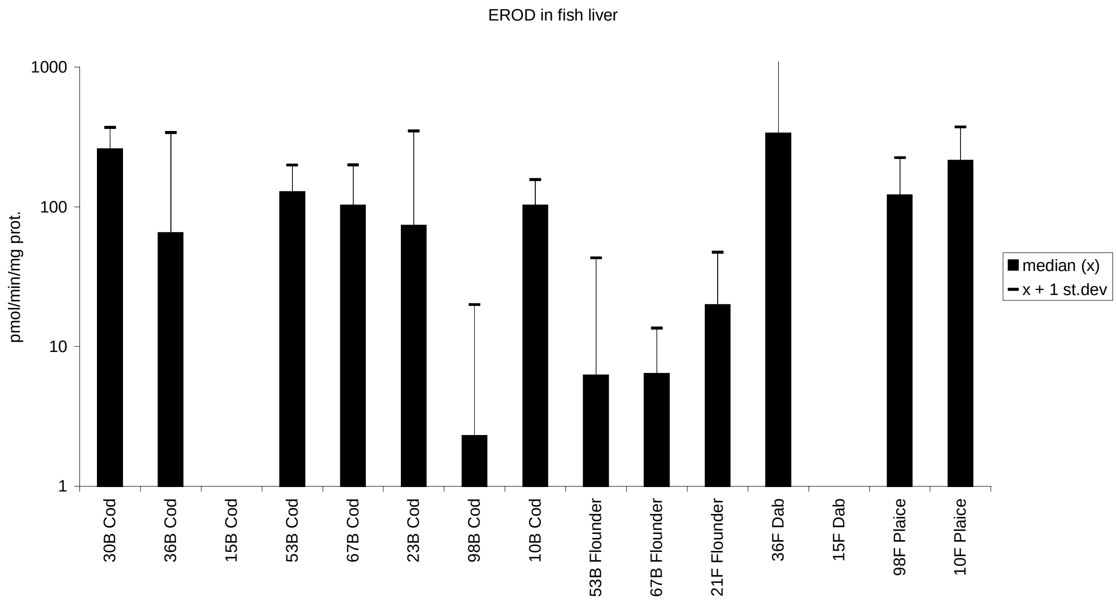


Figure 36. Median and standard deviation concentration for ALA-D (δ-amino levulinic acid dehydrase inhibition) in fish liver 2000 (**A**) and 2001 (**B**), ng PBG (porphobilinogen)/min/mg protein (see maps in Appendix F).

A



B

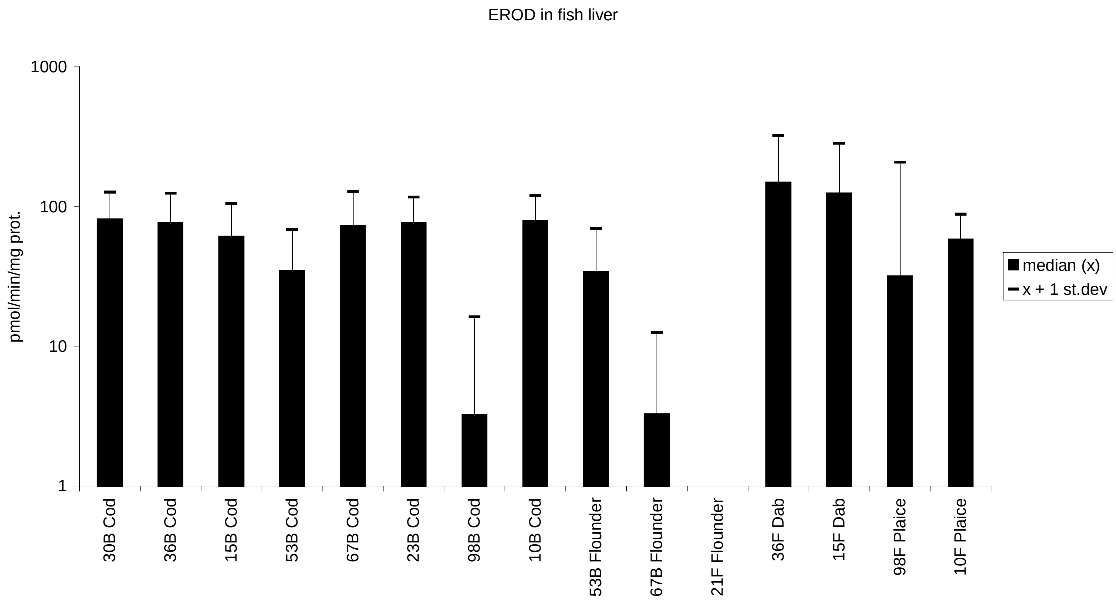
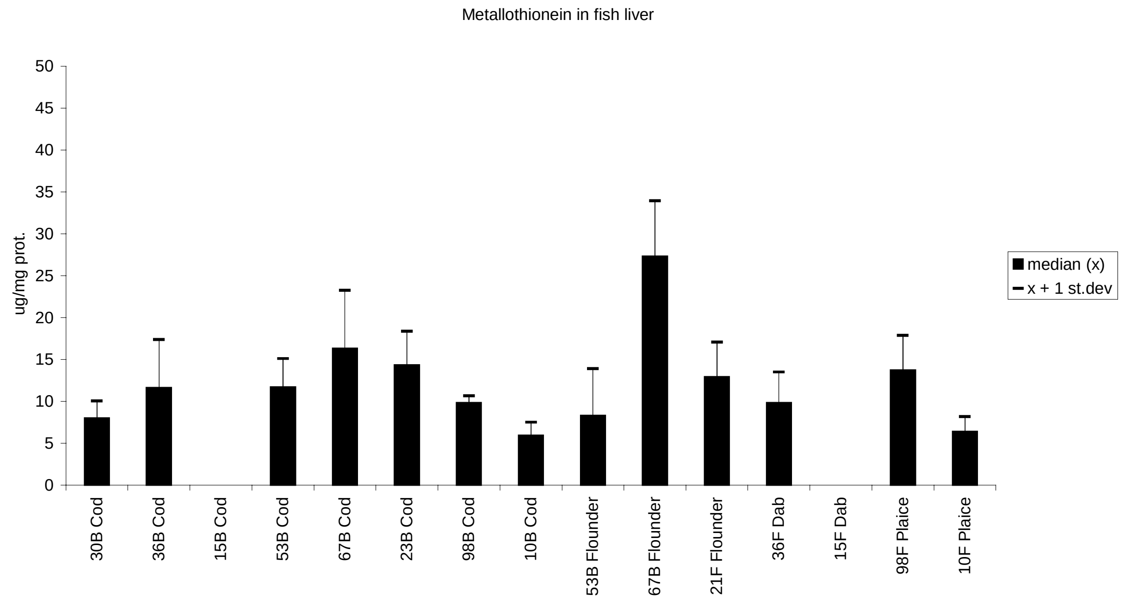


Figure 37. Median and standard deviation concentration for EROD (Cytochrome P4501A-activity) in fish liver 2000 (**A**) and 2001 (**B**), pmol/min/mg protein (see maps in Appendix F).

A



B

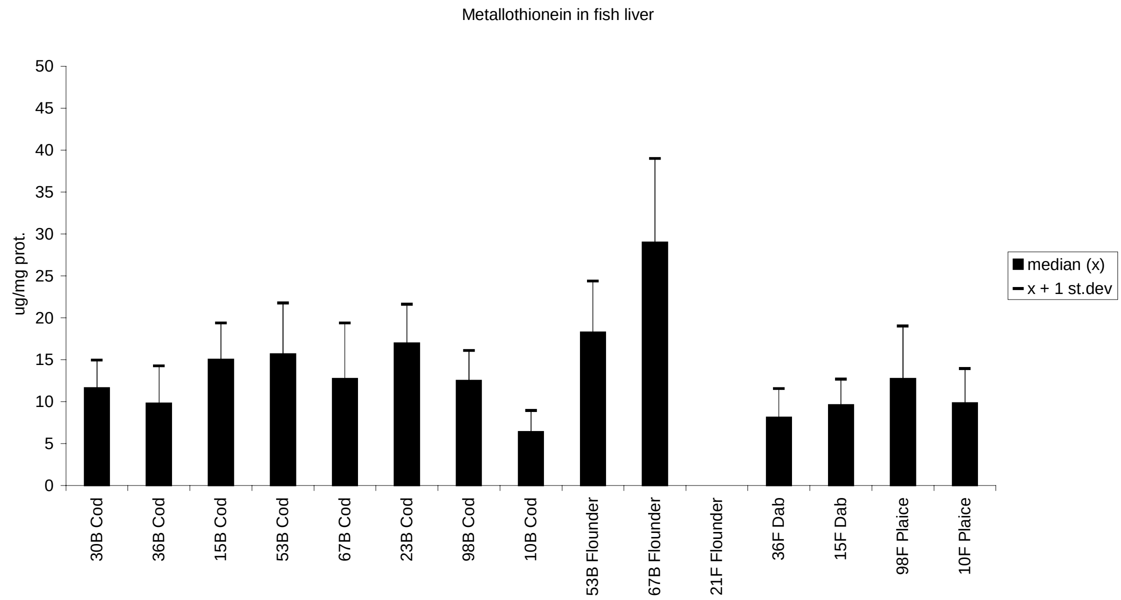


Figure 38. Median and standard deviation concentration for MT (Metallothionein) in fish blood 2000 (**A**) and 2001 (**B**), µg/kg/ABS 380 nm (see maps in Appendix F).

Appendix J
Results from INDEX determinations 1995-2001

Introduction

The Norwegian Pollution Control Authority (SFT) has requested that a small group of indices be established to assess the quality of the environment with respect to contaminants. The target medium for both indices may vary depending on the purpose, however sediment, cod and mussels are considered to be the most likely choices. Blue mussels were selected for this investigation (Appendix J1 and Appendix J2).

Two indices are calculated. One index is based on the contaminant concentrations in the blue mussel collected annually from 9 of the more contaminated fjords in Norway (Walday *et al*. 1995), herein designated “Pollution Index”. This index was initiated in 1995. Initially there were 11 fjords but sampling from Orkdalsfjord and Iddefjord was discontinued in 1997. It was practical to organise sampling within JAMP. Some JAMP results could be used to calculate the index value.

In addition, a “Reference Index” was initiated in 1995 based on annual contaminant concentrations in the blue mussel. The mussels were collect at JAMP stations along the entire coast where there is presumably low levels of contamination. The importance of “reference” stations for monitoring of contaminants has been discussed earlier (cf. Green 1987). One of the main reasons for this work is to establish points of reference for contaminated fjords. Initially 8 areas were involved but since 1998 only 5 have been sampled.

Calculation of the index

Sampling strategy and a detailed discussion of calculation of the Pollution Index has been given earlier (cf. Walday *et al.* 1995) and only a brief summary will be given here. The relevant contaminants for each of the Pollution Index fjords are summarised in Appendix J2 and 3. Their selection is based on earlier investigations. Two to five stations were sampled from each area. Three parallels of 20 individuals from 3-5 cm are collected from each station. Each sample was analysed for the contaminants according to the scheme in Appendix J3. "Dioxins" were only investigated in 1995-96.

One to three stations were sampled from selected areas for the determination of the Reference Index. Each station included three parallels which were analysed for the usual JAMP contaminants (cf. analysis code A, Appendix J3). Some samples were also analysed for PAHs and dioxins.

The strategy for sampling mussels differed depending on whether the mussels were to be used for the Index or for JAMP and Index in that stations that were exclusively to be used for Index calculations allowed a slightly greater size range (3-5 cm) compared to JAMP and that the mussels were frozen directly and not depurated.

The maximum median for each contaminant for all the stations in an area was determined. These concentrations were classified according to SFT's classification system for contaminants in the marine environment (Appendix J4). The highest class found for any contaminant measured in an area determined the index value for that area.

The SFT Classes are based on the provisional "high background" levels. This system has been revised (Molvær *et al.* 1997); where among other changes the sum of CB-28, -52, -101, -118, -138, -153, and -180 (CBΣΣe) is now a distinct parameter for classification. The sum of all PAHs excluding the dicyclic PAHs (PAH_Σ) was compared to the system's "sum-PAH". Previously the calculation of sum-PAH included the dicyclic PAHs. For this report PAH_Σ was calculated for previous years and hence, the classification may vary a class from what has been previously reported. "Dioxins" were assessed based on toxicity equivalency factors (TEQ) according to a Nordic model (Ahlborg 1989) which differs insignificantly from the recently revised WHO-model (van den Berg *et al.* 1998). Note that EPOCl is considered a relevant contaminant for one area but is not included in the part of the classification system based on levels in mussels. Likewise, there are contaminants which are included in the classification system but have not been measured in any area (e.g., tributyltin (TBT), arsenic, fluoride, nickel, silver).

The maximum class found for any contaminant determined the Class (I-V) of the area. The average Class for all the contaminated sub areas and all the reference localities determined the Pollution or Reference Index, respectively. The lowest Index value is 1 and means that all median values were in Class I (insiginificantly polluted). The highest Index value is 5 and means that at least one median value from each of the areas was in Class V (extremely polluted).

Conclusion from application of the indices

To compare the 2001 results with previous years the calculations were done on a common basis with respect to areas and contaminants. Nine fjord areas were used to calculate the Pollution Index for 1998-2001 compared to eight for 1995-1997. No special considerations were made when one but not all the stations within an area were sampled. This occurred seven times for the Pollution Index (st. I205 Bølsnes from Saudafjord 1996, st.I911 Horvika in the Sunndalsfjord 1997 and 1998, st. I021 in the Hvaler area 1999, and st.I962 in the Inner Ranfjord 1999 and 2000, st. I711 Steinholmen (Frierfjord) 2001). Because insufficient amount of mussels were not found at station I911 Horvika 1997-1998, a new station (I913 Fjøseid) was introduced in 1999 between st.I911 and I912 Honnhammer about 15km farther out the fjord. Because insufficient amount of mussels were not found at station I962 Koksverktomta 1999-2000, a new station (I965 - Moholmen) was introduced in 2001 about 2 km south of I962. The Pollution Index for 2001 is 2.7 compared to 2.9 in 2000 (Table 9, Appendix J). A value between 3 and 4 would be termed by the SFT system as markedly polluted (Cl.III) and between 2- and 3 moderately polluted (Cl.III).

Only four-five fjords/areas were monitored for the Reference Index for 1998-2001 compared to seven for 1997 and eight for 1995-1996 (Table 10, Appendix J). However, only four of these provided a common basis (cf., Table 10). Similar to the application Pollution Index, the Reference Index made no special considerations when one but not all the stations within an area were sampled. For these four common areas, this occurred six times in these four areas for the Reference Index (Varangerfjord st.48A 1997-2001 and st.11A 1998-2001). The value for 2001 is 1.8 and is slightly higher than the range for 1995-2000 (1.3-1.5). A value between 1 and 2 would be termed by the SFT system as “Fair”.

Note change in class for Sunndalsfjord from IV in 2000 to II in 2001. Possible episodic discharges in the area are possible but not confirmed (Iversen, pers.comm.). Large variations have also occurred in other areas without explanation (e.g. Inner Kristiandsfjord, Saudafjorden, Sørfjorden).

Note that the reference index for 2000 is 1.5 because Lofoten should be excluded in the calculation, and not 1.4 as reported in SFT report 842/02.

Table 9. Maximum environmental classification for fjords selected for Pollution INDEX. (See text and Appendix J5).

Index Area [1)]	**1995**	**1996**	**1997** [2)]	**1998**	**1999**	**2000**	**2001**
Hvaler/Singlefjord	2	2	2	3	2	2	2
Iddefjord	-	-	-	-	-	-	-
Inner Oslofjord	3	3	4	2	3	2	2
Frierfjord, Grenlandsfjords	3	4	3	3	3	3	3
Inner Kristiansandsfjord	5	5	5	5	5	4	3
Saudafjord	4	5	5	3	4	3	3
Sørfjord	5	4	3	3	4	4	3
Byfjorden, Bergen [3)]	3	3	3	2	2	2	2
Sunndalsfjord	3	3	3 [4)]	2	3	4	2
Orkdalsfjord	-	-	-	-	-	-	-
Inner Ranfjord	5	3	3 [5)]	4	2	2	3
AVERAGE (Pollution INDEX)	**3.7**	**3.6**	**3.4**	**3.0**	**3.1**	**2.9**	**2.7**

[1)] Iddefjord and Orkdalsfjord not sampled since 1997, hence the indices 1995-96 do not include the local indices from these fjords

[2)] Copper, zinc and TCDDN excluded since 1997, hence indices for 1995-96 excludes these contaminants

[3)] PCB (DDTΣ, HCB, HCHΣΣ and CBΣΣ) analysed in stored samples for 1995-1996

[4)] Change in classification (cf. Green *et al.* 1999) due to recalculation of PAHs that excluded the dicyclic compounds

[5)] Change in classification (cf. Green *et al.* 1999) due to calculation error

Table 10. Maximum environmental classification for fjords selected for Reference INDEX. (See text and Appendix J6).

Index Area	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Mid and outer Oslofjord [1)]	2	2	2	1	1	1	2
Lista	1	1	1	1	2	2	2
Bømlo-Sotra	1	1	1	1	1	2	2
Outer Ranfjord, Helgeland [2)]	(1)	(1)	-	-	-	-	-
Lofoten [3)]	(2)	(2)	(1)	(2)	(2)	(1)	(2)
Finnsnes-Skjervøy [2)]	(2)	(1)	(1)	-	-	-	-
Hammerfest-Honningsvåg [2)]	(2)	(3) [4)]	(2)	-	-	-	-
Varanger Peninsula	1	2	1	2	1	1	1
AVERAGE (Reference INDEX)	**1.3**	**1.5**	**1.3**	**1.3**	**1.3**	**1.5**	**1.8**

[1)] Inclusion of results for arsenic, nickel and silver in 1996 (see Appendix J6) did not affect the classification

[2)] Outer Ranfjord, Finnsnes-Skjervøy and Hammerfest-Honningsvåg stations were not sampled in 1998, hence, the index for 1995-97 did not take these results into account. See cf., Green *et al.* 2000 for more details for outer Ranfjord.

[3)] Inconsistency in sampling site, st.98X in 1995-96 and st.98A in 1997, hence, results from Lofoten excluded. See cf., Green *et al.* 2000 for more details for st 98X.

[4)] Change in classification (cf. Green *et al.* 1999) due to recalculation of PAHs that excluded the dicyclic compounds.

Appendix J1
INDEX - Stations and programme 1995-2001

Appendix J1. INDEX station positions and sampling overview for blue mussels 1995-2001, where P = “Pollution Index” and R = “Reference Index” (contaminated and assumed “background” stations, respectively). Mussels were sampled from rock surfaces unless otherwise noted. See Walday *et al.* (1995) for discussion of station selection and analyses.

Station		Locality name	North latitude	East longitude	ICES position	INDEX type P/R	notes
HVALER/SINGLEFJORDEN, east of outer OSLOFJORD							
	I021	Kjøkø, south	59°07.8'	10°57.1'	47G13	P	
	I024	Kirkø, north west	59°04.9'	10°59.2'	47G09	P	
	I022	West Damholmen	59°06.2'	10°57.9'	47G09	P	
	I023	Kirkø, north west	59°05.7'	11°08.2'	47G09	P	
IDDEFJORD, east of outer OSLOFJORD							
	I001	Sponvikskansen	59°05.4'	11°12.5'	47G09	P	
	I011	Kråkenebbet	59°06.1'	11°17.3'	47G09	P	
INNER OSLOFJORD							
JAMP	30A	Gressholmen	59°52.5'	10°43.0'	48G07	P	
	I301	Akershuskaia	59°54.2'	10°45.5'	48G07	P	
	I304	Gåsøya	59°51.0'	10°35.5'	48G04	P	
	I307	Ramtonholmen	59°44.7'	10°31.4'	48G05	P	
	I306	Håøya	59°24.7'	10°33.4'	48G04	P	
MID and OUTER OSLOFJORD							
JAMP	31A	Solbergstrand	59°36.9'	10°39.4'	48G06	R	
JAMP	35A	Mølen	59°29.2'	10°30.1'	47G04	R	
JAMP	36A	Færder	59°01.6'	10°31.7'	47G06	R	
FRIERFJORD AREA, west of outer Oslofjord							
	I711	Steinholmen	59°31.7'	09°40.7'	48F99	P	
	I712	Gjermundsholmen	59°21.7'	09°42.6'	47F99	P	
JAMP	71A	Bjørkøya (Risøyodden)	59°01.4'	09°45.4'	47F99	P	
INNER KRISTIANSANDSFJORD							
	I132	Fiskåtangen	57°07.7'	07°59.2'	43F79	P	
	I133	Odderø, west	57°07.9'	08°00.3'	43F83	P	
LISTA AREA							
JAMP	15A	Gåsøy (Ullerø area)	58°03.1'	06°53.3'	45F69	R	
	I131	Lastad	58°03.3'	07°42.4'	45F79	R	7
SAUDAFJORD							
	I201	Ekkjegrunn (G1)	59°38.7'	06°21.4'	48F66	P	
**	I205	Bølsnes (G5)	59°35.5'	06°18.3'	48F63	P	
BØMLO AREA							
JAMP	22A	Espevær, west	59°35.2'	05°58.5'	48F59	R	C, 1
SØRFJORD							
*	51A	Byrkjenes	60°05.1'	06°33.1'	49F66	P	
JAMP	52A	Eitrheimsneset	60°05.8'	06°32.2'	49F66	P	3

Appendix J1 (cont'd)

Station		Locality name	North latitude	East longitude	ICES position	INDEX type P/R	notes
BYFJORDEN, Bergen							
	I242	Valheimneset	60°23.7'	05°16.1'	49F51	P	
	I241	Nordnes	60°24.1'	05°18.2'	49F51	P	
	I243	Hagreneset	60°24.9'	05°18.3'	49F51	P	
SUNNDALSFJORDen							
	I912	Honnhammer	62°51.2'	08°09.7'	54F81	P	
	I911	Horvika	62°44.1'	08°31.4'	54F85	P	
	I913	Fjøseid	62°49.0'	08°16.48'	54F85	P	
[TRONDHEIM AREA - not related to INDEX investigation**]**							
*	80A	Østmerknes	63°27.5'	10°27.5'	56G04	P	
ORKDALSFJORD AREA, supplementary area (cf. Walday *et al*. 1995)							
JAMP	82A	Flakk	63°27.1'	10°12.6'	56G01	P	
JAMP	84A	Trossavika	63°20.8'	09°57.8'	55F97	P	
JAMP	87A	Ingdalsbukt	63°27.8'	09°54.8'	55F97	P	
INNER RANFJORD							
	I969	Bjørnbærviken (B9)	66°16.8'	14°02.1'	61G42	P	
	I965	Moholmen (B5)	66°19.0'	14°07.5'	61G42	P	
	I962	Koksverkkaien (B2)	66°19.4'	14°08.0'	61G42	P	3
OUTER RANFJORD, Helgeland area							
*	96A	Breiviken	66°17.6'	12°50.5'	61G28	R	1
LOFOTEN AREA							
JAMP	98A	Husvågen (1997)	68°15.4'	14°40.6'	65G46	R	5
JAMP	98A	Husvågen (1998)	68°16.9'	14°40.1'	65G46	R	
FINNSNES-SKJERVØY AREA							
JAMP	41A	Fensneset, Grytøya	68°56.9'	16°38.5'	66G64	R	3
HAMMERFEST-HONNINGSVÅG AREA							
JAMP	44A	Elenheimsundet	70°30.8'	22°14.8'	70H23	R	1, 6
JAMP	46A	Smineset in Altesula	70°58.4'	25°48.1'	70H57	R	3, 6
VARANGER PENINSULA AREA							
JAMP	48A	Trollfjorden i Tanafjord	70°41.6'	28°33.3'	70H85	R	
JAMP	10A	Skagoodden	70°04.2'	30°09.8'	69J03	R	2
JAMP	11A	Sildkroneset, Bøkfjorden	69°47.0'	30°11.1'	68J02	R	

notes:

* - JAMP station but not sampled in accordance to JAMP guidelines, see Annex text.
** - Sufficient mussel-sample not found in 1996.
1 - mussels collected from buoy and/or buoy anchor lines
2 - mussels collected from sand/gravel bottom
3 - mussels collected from iron/cement pilings
4 - mussels collected from metal navigation buoys
5 - mussels collected from floating dock
6 - mussels collected from wooden docks
7 - mussels collected from tire on jetty

Appendix J2
INDEX - Sampling and analyses for 1995-2001

Appendix J2. Blue mussel samples planned or used in INDEX 1995-2001, where P = “Pollution Index” and R = “Reference Index” (contaminated and assumed “background” stations, respectively). + indicates JAMP sampling and analyses (i.e. equivalent to analysis code A). The number indicates the number samples analysed. Codes for analysis (A, B etc.) are defined in Appendix J3. See Walday *et al.* (1995) for discussion of selection of stations and analyses.

	STATION	INDEX	ANALYSIS CODE										
JAMP st.			+	A	B	C	D	E	F	G	H	I	J
	HVALER/SINGLEFJORD AREA												
021	Kjøkø, south	P	.	3	.	.	.	.	.	.	.	.	.
024	Kirøy, north west	P	.	3	.	.	.	.	.	.	.	.	.
022	West Damholmen	P	.	3	.	.	.	.	.	.	.	.	.
023	Singlekalven, south	P	.	3	.	.	.	.	.	.	.	.	.
	IDDEFJORD												
01A	Sponvikskansen	P	.	.	3	.	.	.	.	.	.	.	.
011	Kråkenebbet	P	.	.	3	.	.	.	.	.	.	.	.
	OSLOFJORD, inner												
30A	Gressholmen	P	+	.	.	.	.	.	.	.	3	.	1
301	Akershuskaia	P	.	.	.	3	.	.	.	.	.	.	.
304	Gåsøya	P	.	.	.	3	.	.	.	.	.	.	.
307	Ramtonholmen	P	.	.	.	3	.	.	.	.	.	.	.
306	Håøya	P	.	.	.	3	.	.	.	.	.	.	.
	OSLOFJORD, mid and outer												
31A	Solbergstrand	R	+	.	.	.	.	.	.	.	.	.	1
35A	Mølen	R	+	.	.	.	.	.	.	.	.	.	.
36A	Færder	R	+	.	.	.	.	.	.	.	.	.	2*
	FRIERFJORD AREA, west of outer Oslofjord												
711	Steinholmen	P	.	.	.	.	3	.	.	.	.	.	1
712	Gjermundsholmen	P	.	.	.	.	3	.	.	.	.	.	1
71A	Bjørkøya	P	+	.	.	.	.	.	.	.	.	.	1
	INNER KRISTRIANSANDSFJORD												
132	Fiskåtangen	P	.	.	.	.	.	3	.	.	.	.	1
133	Odderø, west	P	.	.	.	.	.	3	.	.	.	.	1
	LISTA AREA												
15A	Gåsøya	R	+	.	.	.	.	.	.	.	.	.	1
131	Lastad	R	.	.	.	3.	.	.	.	.	.	.	.
	SAUDAFJORD												
201	Ekkjegrunn (G1)	P	.	.	.	.	.	.	3	.	.	.	.
205	Bølsnes (G5)	P	.	.	.	.	.	.	3	.	.	.	.
	BØMLO-SOTRA AREA												
22A	Espevær, west	R	+	.	.	.	.	.	.	.	.	.	2*
	SØRFJORD												
51A	Byrkjeneset	P	.	3	.	.	.	.	.	.	.	.	.
52A	Eirtrheimsneset	P	+	.	.	.	.	.	.	.	.	.	.

*) indicates Toxaphene included

Appendix J2 (cont'd)

JAMP st.	STATION	INDEX					+	A	B	C	D	E	F	G	H	I	J
	BYFJORDEN, BERGEN																
242	Valheimsneset	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
241	Nordnes	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
243	Hagreneset	P	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.
	SUNNDALSFJORD																
912	Honnhammer	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
913	Fjøseid	P	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.
	[TRONDHEIM AREA - not related to index investigation]																
80A	Østmarknes	-	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
	ORKDALSFJORD AREA (not suggested in Walday *et al.* 1995)																
82A	Flakk	P	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
84A	Trossavika	P	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
87A	Ingdalsbukta	P	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
	INNER RANFJORD																
965	Moholmen (B5)	P	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
969	Bjørnbærvikenn (B9)	P	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
	OUTER RANFJORD, HELGELAND AREA																
96A	Breivika, Tomma	R	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.
	LOFOTEN AREA																
98A	Husvågen	R	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1
	FINNSNES-SKJERVØY AREA																
41A	Fensneset, Grytøya	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	1
	HAMMERFEST-HONNINGSVÅG AREA																
44A	Elenheimsundet	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	2*
46A	Smineset in Altesula	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	1*
	VARANGER PENINSULA AREA																
48A	Trollfjorden i Tanafjord	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	.
10A	Skagoodden	R	.	.	.	.	+	.	.	.	.	.	.	.	3	.	1
11A	Sildkroneset	R	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1

*) indicates Toxaphene included

Appendix J3
INDEX - Key to analysis codes and sample counts

(Used in Appendix J2)

ANALYSIS CODES[1)] See Walday *et al.* (1995) for discussion of selection of analyses.

Contaminant	Analysis code									
	A	B	C	D	E	F	G	H	I	J
Lead	x	x	.	.	.	x	.	.	x	.
Cadmium	x	x	x	.	.	x	.	.	x	.
Copper [2])	x	x	x	.	.	.	.	.	.	.
Mercury	x	x	x	.	.	.	.	.	.	.
Zinc [2])	x	x	x	.	.	.	x	.	x	.
EPOCl	.	.	.	.	x	.	.	.	.	.
PAHs	.	.	x	.	x	x	.	x	x	.
PCBs	x	.	x	x	x	.	x	.	.	.
"Dioxin" [3])	.	.	.	.	.	.	.	.	.	x

[1]) Concerns MUSSEL 1 size group (3-5 cm), 3 parallel samples each a bulk of 20 individuals (see text)
[2]) Concerns MUSSEL discontinued since 1996
[3]) Concerns MUSSEL discontinued since 1995

Appendix J4
INDEX - SFT Environmental quality classes

(Molvær *et al.* 1997)

As	arsenic
Pb	lead
F	fluoride
Cd	cadmium
Cu	copper
Cr	chromium
Hg	mercury
Ni	nickel
Zn	zinc
Ag	silver
PAH_S	total PAH excluding dicyclic (=PAH_Σ)*
BAP	benzo[*a*]pyrene
DDTSS	DDTPP+DDEPP+TDEPP (=DDTΣΣ)*
HCB	hexachlorobenzene
HCHSS	HCHG+HCHA+HCHB (=HCHΣΣ)*
CBSSe	sum of CB: 28+52+101+118+138+153+180 *
TCDDN	Sum of TCDD-toxicity equivalents *

*) See also Appendix B for definitions.

Basis: D = dry weight, W = wet weight
Units: M = ppm (mg/kg), U = ppb (µg/kg), P = ppp (ng/kg)

SFT's Environmental quality classes for blue mussels (Molvær *et al.* 1997).

Contaminant	basis	unit	Class 1	Class 2	Class 3	Class 4	Class 5
As	D	M	<10	10-30	30-100	100-200	>200
Pb	D	M	<3	3-15	15-40	40-100	>100
F	D	M	<15	15-50	50-150	150-300	>300
Cd	D	M	<2	2-5	5-20	20-40	>40
Cu	D	M	<10	10-30	30-100	100-200	>200
Cr	D	M	<3	3-10	10-30	30-60	>60
Hg	D	M	<0.2	0.2-0.5	0.5-1.5	1.5-4	>4
Ni	D	M	<5	5-20	20-50	50-100	>100
Zn	D	M	<200	200-400	400-1000	1000-2500	>2500
Ag	D	M	<0.3	0.3-1	1-2	2-5	>5
PAH_S	W	U	<50	50-200	200-2000	2000-5000	>5000
BAP	W	U	<1	1-3	3-10	10-30	>30
DDTSS	W	U	<2	2-5	5-10	10-30	>30
HCB	W	U	<0.1	0.1-0.3	0.3-1	1-5	>5
HCHSS	W	U	<1	1-3	3-10	10-30	>30
CBSSe	W	U	<4	4-15	15-40	40-100	>100
TCDDN	W	P	<0.2	0.2-0.5	0.5-1.5	1.5-3	>3

Appendix J5
INDEX - Summary table “Pollution index” 1995-2001

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.7

Index areaname (Pollution area) 1995	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	1.06	i	1.73	i	i	0.2	i	i	i	i	i	0.93	0.1	0.53	6.73	i	II
Iddefjord	1	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	i	1.33	i	i	0.1	i	i	i	<132.90	0.8	1.95	<0.05	0.41	20.6	i	III
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.85	0.6	0.27	4.74	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	1088.5	15	0.65	9.6	0.76	5.08	i	V
Saudafjord	2	2	i	4.77	i	0.82	i	i	i	i	i	i	<428.80	15	i	i	i	i	i	IV
Sørfjord	2	2	i	149	i	36.8	i	i	1.5	i	i	i	i	i	6.01	0.1	0.28	2.67	i	V
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	3.76	0.2	0.74	19	i	III
Sunndalsfjord	2	2	i	i	i	i	i	i	i	i	i	i	809.8	8	i	i	i	i	i	III
Orkdalsfjord area	3	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	4.44	i	0.75	i	i	i	i	i	i	785.7	31	i	i	i	i	i	V

I	20
II	10
III	9
IV	4
V	3

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.6

Index areaname (Pollution area) 1996	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	2.29	i	2.26	i	i	0.4	i	i	i	i	i	<0.56	0.1	0.27	4.83	i	II
Iddefjord	1	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	i	0.82	i	i	0.1	i	i	i	<644.80	3.3	1.08	<0.05	0.3	20.86	i	III
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.26	2.2	0.19	4.18	i	IV
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<542.40	17	0.61	18	1.32	6.64	i	V
Saudafjord	1	2	i	4.39	i	0.86	i	i	i	i	i	i	891.4	35	i	i	i	i	i	V
Sørfjord	2	2	i	60.3	i	25.3	i	i	0.9	i	i	i	i	i	4.08	<0.05	0.6	1.92	i	IV
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	7.8	0.2	1.03	30.72	i	III
Sunndalsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<290.00	3.8	i	i	i	i	i	III
Orkdalsfjord area	3	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	5.34	i	0.61	i	i	i	i	i	i	301.9	6.2	i	i	i	i	i	III

I	16
II	12
III	12
IV	4
V	2

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.4

Index areaname (Pollution area) 1997	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	1.65	i	2.48	i	i	0.5	i	i	i	i	i	1.14	0.1	0.42	5.61	i	II
Iddefjord	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	i	0.86	i	i	0.1	i	i	i	<409.10	3.5	12.08	0.1	0.79	33.81	i	IV
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.65	0.8	0.26	<2.68	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	356	9.1	1.22	7.6	0.81	<6.00	i	V
Saudafjord	2	2	i	6.96	i	1.37	i	i	i	i	i	i	2726.5	108	i	i	i	i	i	V
Sørfjord	2	2	i	20.6	i	13.4	i	i	0.3	i	i	i	i	i	5.07	<0.05	0.29	<2.71	i	III
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	2.94	0.1	0.4	24.54	i	III
Sunndalsfjord	1	2	i	i	i	i	i	i	i	i	i	i	<238.90	1.4	i	i	i	i	i	III
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	3.55	i	0.64	i	i	i	i	i	i	<132.90	3.1	i	i	i	i	i	III

I	17
II	13
III	12
IV	2
V	2

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.0

Index areaname (Pollution area) 1998	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	2.12	i	3.31	i	i	0.9	i	i	i	i	i	1.13	0.1	<0.23	<4.42	i	III
Iddefjord	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	i	1.27	i	i	0.1	i	i	i	<149.20	1	2.34	0.1	0.59	13.75	i	II
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	<0.63	0.7	0.41	3.18	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<279.00	3.8	0.53	7.2	<0.65	<5.09	i	V
Saudafjord	2	2	i	4.67	i	0.93	i	i	i	i	i	i	<550.50	9.8	i	i	i	i	i	III
Sørfjord	2	2	i	29.6	i	10.3	i	i	0.6	i	i	i	i	i	w	0.1	0.51	2.04	i	III
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	<2.83	0.2	0.79	10.87	i	II
Sunndalsfjord	1	2	i	i	i	i	i	i	i	i	i	i	<180.00	1	i	i	i	i	i	II
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	2	i	2.99	i	0.61	i	i	i	i	i	i	257.5	12	i	i	i	i	i	IV

I	19
II	14
III	10
IV	1
V	1

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 3.1

Index areaname (Pollution area) 1999	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	3	4	i	1.94	i	2.45	i	i	0.42	i	i	i	i	i	<1.15	0.09	<0.26	3.27	i	II
Iddefjord	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	i	1.29	i	i	0.11	i	i	i	223.9	2.1	2.2	0.25	<0.34	20.01	i	III
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.76	0.6	<0.28	<2.64	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<1172.40	48	0.73	0.3	0.29	<4.10	i	V
Saudafjord	2	2	i	5.97	i	1.49	i	i	i	i	i	i	622.8	14	i	i	i	i	i	IV
Sørfjord	2	2	i	37.14	i	34.71	i	i	2.89	i	i	i	i	i	6.21	0.07	0.35	<2.42	i	IV
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	4.5	0.12	0.28	13.88	i	II
Sunndalsfjord	2	3	i	i	i	i	i	i	i	i	i	i	384.2	3	i	i	i	i	i	III
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	1	2	i	5.13	i	0.59	i	i	i	i	i	i	<173.60	1.95	i	i	i	i	i	II

I	19
II	13
III	10
IV	3
V	1

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 2.9

Index areaname (Pollution area) 2000	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	1.05	i	1.83	i	i	0.36	i	i	i	i	i	<0.93	0.09	<0.32	<2.77	i	II
Iddefjord	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	i	1.13	i	i	0.06	i	i	i	<118.80	0.5	3.2	0.1	<0.31	11.45	i	II
Frierfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	0.56	0.43	0.21	<2.15	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<246.60	1.8	0.33	1.1	<0.26	1.9	i	IV
Saudafjord	2	2	i	7.09	i	1.99	i	i	i	i	i	i	<383.00	7.2	i	i	i	i	i	III
Sørfjord	2	2	i	91.67	i	27.33	i	i	3.86	i	i	i	i	i	4.27	0.05	0.29	<1.75	i	IV
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	2.85	0.12	<0.26	9.88	i	II
Sunndalsfjord	2	3	i	i	i	i	i	i	i	i	i	i	1287.8	23	i	i	i	i	i	IV
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	1	2	i	3	i	0.83	i	i	i	i	i	i	<192.50	2.8	i	i	i	i	i	II

I	23
II	13
III	5
IV	5
V	0

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 2.7

Index areaname (Pollution area) **2001**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Hvaler/Singlefjorden	4	4	i	1.65	i	2.53	i	i	0.44	i	i	i	i	i	<0.62	<0.10	<0.15	<2.82	i	II
Iddefjord	0	2	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Oslofjord	5	5	i	i	i	1.16	i	i	0.07	i	i	i	<110.40	1.3	<0.99	0.1	<0.23	8.59	i	II
Frierfjorden	2	3	i	i	i	i	i	i	i	i	i	i	i	i	0.7	0.37	<0.15	<1.96	i	III
Inner Kristiandsfjord	2	2	i	i	i	i	i	i	i	i	i	i	<182.90	5	0.28	0.48	<0.10	<2.44	i	III
Saudafjord	2	2	i	6.15	i	1.49	i	i	i	i	i	i	<186.10	4.5	i	i	i	i	i	III
Sørfjord	2	3	i	32.35	i	5.59	i	i	0.77	i	i	i	i	i	3.41	<0.10	<0.15	<9.72	i	III
Byfjorden	3	3	i	i	i	i	i	i	i	i	i	i	i	i	4.01	0.09	<0.20	11.33	i	II
Sunndalsfjord	2	3	i	i	i	i	i	i	i	i	i	i	<141.55	0.7	i	i	i	i	i	II
Orkdalsfjord area	0	3	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	i	miss
Inner Ranfjord	2	3	i	20	i	2.02	i	i	i	i	i	i	<362.60	27	i	i	i	i	i	IV

I	22
II	14
III	9
IV	1
V	0

Appendix J6
INDEX - Summary table “Reference Index” 1995-2001

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.5

Index areaname (Reference area) **1995**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	1.68	w	1.32	i	w	0.1	w	i	w	w	w	<0.95	0.1	0.4	7.86	i	II
Lista area	2	2	w	0.52	w	1.44	i	w	0.1	w	i	w	<31.60	0.5	<0.34	<0.05	0.38	<1.28	i	I
Bømlo-Sotra area	1	1	w	1.18	w	1.41	i	w	0.1	w	i	w	w	w	<0.46	<0.05	0.31	<1.38	i	I
Outer Ranfjord, Helgeland area	1	2	w	1.12	w	0.96	i	w	0.1	w	i	w	<37.70	<0.50	0.21	<0.05	0.38	<0.90	i	I
Lofoten area	1	2	w	3.12	w	0.69	i	w	0.3	w	i	w	w	w	4.42	0.1	0.15	12.31	i	II
Finnsnes- Skjervøy area	1	1	w	0.9	w	2.95	i	w	0.1	w	i	w	w	w	<0.18	<0.05	0.16	<0.81	i	II
Hammerfest-Honningsvåg area	2	2	w	2.57	w	2.74	i	w	0.1	w	i	w	<129.90	0.7	<0.23	<0.05	<0.15	<1.34	i	II
Varanger peninsula area	3	3	w	2.78	w	1.71	i	w	0.2	w	i	w	<6.90	<0.50	<0.36	<0.05	0.16	<0.88	i	I

I	56
II	8
III	0
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.6

Index areaname (Reference area) **1996**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	7	2.04	w	1.6	i	0.5	0	0.9	i	0.1	w	w	<0.25	<0.05	0.25	13.95	i	II
Lista area	2	2	w	0.67	w	1.22	i	w	0.1	w	i	w	<44.60	<0.50	<0.20	<0.05	0.29	<2.14	i	I
Bømlo-Sotra area	1	1	w	1.51	w	1.14	i	w	0.1	w	i	w	w	w	<0.11	<0.05	<0.14	<0.78	i	I
Outer Ranfjord, Helgeland area	1	2	w	0.9	w	0.78	i	w	0.1	w	i	w	w	w	<0.12	<0.05	0.21	<0.62	i	I
Lofoten area	1	2	w	4.11	w	0.78	i	w	0.3	w	i	w	w	w	<1.15	<0.05	<0.13	8.9	i	II
Finnsnes- Skjervøy area	1	1	w	0.79	w	1.63	i	w	0.1	w	i	w	<24.25	<0.50	<0.05	<0.05	<0.05	<0.40	i	I
Hammerfest- Honningsvåg area	2	2	w	1.66	w	2.72	i	w	0.1	w	i	w	<212.50	0.8	<0.11	<0.05	<0.11	<1.59	i	III
Varanger peninsula area	3	3	w	0.74	w	2.34	i	w	0.1	w	i	w	<21.30	<0.50	<0.14	<0.05	0.14	<0.98	i	II

I	61
II	6
III	1
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.3

Index areaname (Reference area) **1997**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	2.17	w	1.84	i	w	0.1	w	i	w	w	w	2.75	0.1	1.16	4.9	i	II
Lista area	2	2	w	1.12	w	1.14	i	w	0.1	w	i	w	<36.70	<0.50	0.58	<0.05	0.53	2.43	i	I
Bømlo-Sotra area	1	1	w	1.37	w	1.01	i	w	0.1	w	i	w	w	w	<0.39	<0.05	0.26	<0.73	i	I
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	1.54	w	0.85	i	w	0.1	w	i	w	w	w	0.61	<0.05	0.14	<1.57	i	I
Finnsnes- Skjervøy area	1	1	w	0.65	w	1.88	i	w	0.1	w	i	w	w	w	<0.15	<0.05	0.12	<0.40	i	I
Hammerfest-Honningsvåg area	1	2	w	1.15	w	1.51	i	w	0.1	w	i	w	w	w	0.27	<0.05	0.18	<4.49	i	II
Varanger peninsula area	2	3	w	0.81	w	1.59	i	w	0.2	w	i	w	w	w	0.33	0.1	0.13	<1.07	i	I

I	46
II	5
III	0
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.4

Index areaname (Reference area) **1998**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	1.57	w	1.14	i	w	0.1	w	i	w	w	w	<1.30	<0.03	<0.52	<2.01	i	I
Lista area	2	2	w	1.28	w	1.31	i	w	0.1	w	i	w	<42.70	<0.50	0.6	<0.03	<0.53	3.58	i	I
Bømlo-Sotra area	1	1	w	1.21	w	0.85	i	w	0.1	w	i	w	w	w	<1.61	<0.03	<0.51	<2.05	i	I
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	2.36	w	1.58	i	w	0.2	w	i	w	w	w	<2.28	<0.05	<0.20	<1.21	i	II
Finnsnes- Skjervøy area	0	1	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Hammerfest-Honningsvåg area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Varanger peninsula area	1	3	w	2.34	w	2.32	i	w	0.1	w	i	w	w	w	w	w	w	w	i	II

I	31
II	2
III	0
IV	0
V	0

Max(median). Statistics for all areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.4

Index areaname (Reference area) **1999**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	1	w	1.53	i	w	0.1	w	i	w	w	w	1.83	<0.05	<0.44	2.88	i	I
Lista area	2	2	w	1.66	w	1.18	i	w	0.1	w	i	w	<68.05	1	<0.67	0.1	<0.40	<2.49	i	II
Bømlo-Sotra area	1	1	w	1.7	w	1.32	i	w	0.1	w	i	w	w	w	<0.54	<0.05	<0.23	<0.93	i	I
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	1.59	w	2.17	i	w	0.3	w	i	w	w	w	<0.52	<0.06	<0.20	<0.43	i	II
Finnsnes- Skjervøy area	0	1	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Hammerfest-Honningsvåg area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Varanger peninsula area	1	3	w	1.57	w	1.61	i	w	0.1	w	i	w	w	w	<0.47	<0.05	<0.30	<0.90	i	I

I	33
II	4
III	0
IV	0
V	0

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.4

Index areaname (Reference area) **2000**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	0.94	w	1.65	i	w	0.05	w	i	w	w	w	0.77	0.09	0.41	<1.31	i	I
Lista area	2	2	w	2.2	w	1.98	i	w	0.16	w	i	w	<66.40	<0.50	<0.36	0.06	<0.32	<2.20	i	II
Bømlo-Sotra area	1	1	w	1.3	w	2.69	i	w	0.03	w	i	w	w	w	0.51	0.04	0.29	<1.07	i	II
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	1.49	w	1.68	i	w	0.11	w	i	w	w	w	<0.20	<0.05	<0.19	<0.53	i	I
Finnsnes- Skjervøy area	0	1	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Hammerfest-Honningsvåg area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Varanger peninsula area	1	3	w	1.44	w	1.53	i	w	0.05	w	i	w	w	w	<0.18	<0.05	<0.16	<0.75	i	I

I	35
II	2
III	0
IV	0
V	0

Max(median). Statistics for alle areas: (n = Index-station measured, N = Station programmed for index)

Average of Max E.C is 1.8

Index areaname (Reference area) **2001**	n	N	As ppm d.wt	Pb ppm d.wt	F ppm d.wt	Cd ppm d.wt	Cu ppm d.wt	Cr ppm d.wt	Hg ppm d.wt	Ni ppm d.wt	Zn ppm d.wt	Ag ppm d.wt	PAH_S ppb w.wt	BAP ppb w.wt	DDTSS ppb w.wt	HCB ppb w.wt	HCHSS ppb w.wt	CBSSe ppb w.wt	TCDDN ppp w.wt	Max E.C I:V
Mid and outer Oslofjord	3	3	w	0.87	w	2.59	i	w	0.05	w	i	w	w	w	1.5	<0.10	<0.32	<1.73	i	II
Lista area	2	2	w	0.96	w	4.4	i	w	0.08	w	i	w	<17.60	<0.50	<0.28	<0.10	<0.15	<2.14	i	II
Bømlo-Sotra area	1	1	w	1.21	w	2.01	i	w	0.05	w	i	w	w	w	<0.45	<0.10	<0.15	<0.66	i	II
Outer Ranfjord, Helgeland area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Lofoten area	1	2	w	1.34	w	2.38	i	w	0.11	w	i	w	w	w	<0.53	<0.10	<0.15	<0.56	i	II
Finnsnes- Skjervøy area	0	1	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Hammerfest-Honningsvåg area	0	2	w	w	w	w	i	w	w	w	i	w	w	w	w	w	w	w	i	miss
Varanger peninsula area	1	3	w	1.39	w	1.23	i	w	0.05	w	i	w	w	w	<0.15	<0.10	<0.15	<0.15	i	I

I	33
II	4
III	0
IV	0
V	0

Appendix K
Effects and concentrations of organotin 2001

Table 11. Imposex (VDSI, RPSI) and levels of TBT (µg Sn/kg d.w.) in dogwhelks (*Nucella lapillus*) in 2001 from outer Oslofjord (St. 36G), Langesundsfjord (71G), southern Norway (76G, 131G), south-west Norway (15G), Haugesund (227G), western Norway (22G) and northern Norway (98G), in 2001. SH = avg. shell height in mm. (cf. Appendix F, Maps 2-5 and 16).

St.	Area	SH	VDSI	RPSI	TBT	n
36G	Færder	31.4	3.95	0.08	20.3	22
71G	Langesund, Fuglø	23.0	4.00	0.17	37.6	31
76G	Risør, Risø	25.6	3.41	0.01	16.8	37
131G	Mandal, Lastad - Y. Notevikhlm	21.6	3.89	0.07	13.4	35
15G	Farsund, Ullerøya	26.1	3.69	0.04	29.0	29
227G	Melandholmen	26.9	4.30	0.51	55.3	33
22G	Espevær	24.3	4.00	0.19	28.7	27
98G	Husvågen	31.3	3.50	0.05	10.7	22

Table 12. Levels of TBT (µg Sn/kg d.w.) in bulk samples (n=50) of mussels (*Mytilus edulis*) in 2001 from inner Oslofjord (St. 30A), outer Oslofjord (36A), Langesundsfjord (71A), Risør (76A), southern Norway (I131), south-west Norway (15A), Haugesund (227A), western Norway (22A), Svolvær, Lofoten (98A) and northern Norway (10A) in 2001. Sh.length = avg. shell length in mm. Class condition for TBT (formula based) on a dry weight basis in the Norwegian classification system for environmental quality. (cf. Table 6) (cf. Appendix F, Maps 1-5, 16 and 24).

St.	Area	Sh. length	TBT	TBT* (ppm)	Class
30A	Gressholmen	27	329	0.80	markedly polluted
30A	Gressholmen	35	279	0.68	markedly polluted
30A	Gressholmen	44	467	1.14	markedly polluted
36A	Færder	34	23	0.06	moderately polluted
36A	Færder	44	26	0.06	moderately polluted
71A	Langesund, Bjørkøy	44	177	0.43	moderately polluted
76A	Risør, Risø	44	22	0.05	moderately polluted
I131	Lastad	41	201	0.49	moderately polluted
15A	Farsund, Gåsøy	35	38	0.09	moderately polluted
15A	Farsund, Gåsøy	43	43	0.10	moderately polluted
227A	Haugesund	40	141	0.34	moderately polluted
227A	Haugesund	40	231	0.56	markedly polluted
227A	Haugesund	40	171	0.42	moderately polluted
22A	Espevær	34	63	0.15	moderately polluted
22A	Espevær	44	77	0.19	moderately polluted
98A	Husvågen	45	42	0.10	moderately polluted
98A	Husvågen	45	47	0.11	moderately polluted
10A	Skallneset	24	8	0.02	insignificantly poll.
10A	Skallneset	24	10	0.03	insignificantly poll.

*) TBT ppb dw converted to formulation basis ppm dw by a factor of 2.44/1000.

Appendix L
Contaminant concentrations in deep-water fish 2000 and 2001

Sorted by contaminant and species:

Cadmium (Cd)
Copper (Cu)
Mercury (Hg)
Lead (Pb)
Zinc (Zn)
CB 153
Sum of 7 CBs (CB-28, -52, 101, -118, -138, -153 and -180)
DDEPP (ppDDE)
HCB

GADU MOR - Atlantic cod (*Gadus morhua***)**
BROS BRO - tusk, brosme (*Brosme brosme)*
MOLV MOL - ling, lange (*Molva molva*)
CHIM MON - rat fish, havmus (*Chimaera monstrosa*)

Station positions are shown on maps in Appendix F

Table 13. Simple statistics for contaminants measured in liver and fillet of cod (*Gadus morhua*) from Karihavet (st. 23B) and inner Sørfjord (st.53B) and deep-water fish tusk *Brosme brosme*, ling *Molva molva*, and rat fish *Chimaera monstrosa* from Åkrafjord (st.21D) and Sørfjord (st.56D and 53D). Cod is included for comparison and was caught between 20-60m depth during the fall of 1999-2001. The remaining fish were caught at about 350m depth in April 2000 and during the autumn of 2001. Values for Cadmium (Cd), copper (Cu), lead (Pb), zinc (Zn) and mercury (Hg) are given in ppm (mg/kg) on a wet weight basis. Values for PCB congener 153, (CB153), ΣPCB (PCB-sum7, sum of CB 28, 52, 101, 118, 138, 153 and 180), ppDDE (DDEPP) and HCB are given in ppb (µg/kg) on a wet weight basis. Values below detection limit are discarded. The exception was for ΣPCB where such values for the relevant congeners were calculated as the detection limit. Only ΣPCBs where all seven congeners were measured were used. Simple statistics included: count (N-ww), average (M-ww), standard deviation (SD-ww), median (50-ww), 75-percentile (75-ww), 90-percentile and maximum.Statistics for fish length (lngmm in mm), weight (wtgm in g), dry weight % of liver (DW%) and fat weight % of liver (FW%) is also given. The table is divided into four sections:

Table 13A. Contaminants in fish liver from "Reference" area (st.23B and 21D),
Table 13B. Contaminants in fish liver from "Contaminated" area (st. 53B/D and 56D),
Table 13C. Contaminants in fish fillet from "Reference" area (st.23B and 21D),
Table 13D. Contaminants in fish fillet from "Contaminated" area (st. 53B/D and 56D)

Table 13A Fish liver from "Reference" area (st.23B and 21D). Concentrations for metals in ppm (mg/kg) w.wt. and for organochlorines in µg/kg w.wt..

spp	tis	parameter	N-ww	M-ww	SD-ww	50-ww	75-ww	90-ww	MAX-ww
Gadu mor	LI	Lngmm	75	545.3	97.2	**550.0**	610.0	670.0	750.0
Gadu mor	LI	Wtgm	75	1819.9	1026.0	**1639.0**	2472.8	3189.0	4938.0
Gadu mor	LI	DW%	73	59.3	12.3	**60.6**	68.6	74.1	82.8
Gadu mor	LI	FW%	72	47.3	15.9	**51.0**	60.8	66.0	76.0
Gadu mor	LI	CD	75	0.03	0.02	**0.02**	0.03	0.05	0.10
Gadu mor	LI	CU	75	10.94	7.03	**10.30**	14.60	18.90	35.90
Gadu mor	LI	PB [1)]	2	0.15	0.17	**0.15**	*	0.27	0.27
Gadu mor	LI	ZN	75	30.23	10.54	**28.80**	35.10	46.20	63.20
Gadu mor	LI	CB153	72	96.4	66.4	**83.5**	110.0	149.0	460.0
Gadu mor	LI	PCB-sum7	72	227.9	151.5	**201.2**	249.0	324.6	1040.0
Gadu mor	LI	DDEPP	72	58.8	36.3	**49.5**	71.0	93.0	280.0
Gadu mor	LI	HCB	72	8.5	3.0	**7.9**	10.8	12.0	19.0
Bros bro	LI	Lngmm	5	624.2	97.8	**637.0**	703.0	768.0	768.0
Bros bro	LI	Wtgm	5	2878.5	1470.5	**2782.7**	4065.0	5290.0	5290.0
Bros bro	LI	DW%	4	64.9	4.6	**63.9**	69.7	70.8	70.8
Bros bro	LI	FW%	5	58.6	7.6	**58.0**	66.0	69.0	69.0
Bros bro	LI	CD	5	0.08	0.05	**0.06**	0.13	0.17	0.17
Bros bro	LI	CU	5	1.25	0.25	**1.18**	1.44	1.69	1.69
Bros bro	LI	PB [2)]	0	*	*	*****	*	*	*
Bros bro	LI	ZN	5	12.19	1.99	**11.80**	14.20	14.50	14.50
Bros bro	LI	CB153	5	462.0	307.0	**310.0**	765.0	940.0	940.0
Bros bro	LI	PCB-sum7	5	1125.9	755.5	**807.8**	1869.7	2303.7	2303.7
Bros bro	LI	DDEPP	5	480.0	283.5	**390.0**	755.0	920.0	920.0
Bros bro	LI	HCB	5	14.0	4.3	**14.0**	18.0	19.0	19.0
Molv mol	LI	Lngmm	5	891.2	143.4	**900.0**	1026.5	1047.0	1047.0
Molv mol	LI	Wtgm	5	3623.0	1229.1	**3940.0**	4702.5	4920.0	4920.0
Molv mol	LI	DW%	4	69.8	3.9	**70.6**	73.0	73.5	73.5
Molv mol	LI	FW%	5	60.2	3.8	**60.0**	64.0	65.0	65.0
Molv mol	LI	CD	5	0.13	0.17	**0.01**	0.32	0.38	0.38
Molv mol	LI	CU	5	3.46	1.58	**3.23**	4.91	5.93	5.93
Molv mol	LI	PB [2)]	0	*	*	*****	*	*	*
Molv mol	LI	ZN	5	16.66	2.81	**16.60**	18.95	21.00	21.00
Molv mol	LI	CB153	5	302.0	165.3	**220.0**	475.0	530.0	530.0
Molv mol	LI	PCB-sum7	5	854.3	473.9	**595.0**	1354.2	1498.0	1498.0
Molv mol	LI	DDEPP	5	528.0	230.0	**580.0**	740.0	790.0	790.0
Molv mol	LI	HCB	5	16.0	5.4	**13.0**	21.5	24.0	24.0
Chim mon	LI	Lngmm	3	802.7	51.4	**773.0**	862.0	862.0	862.0
Chim mon	LI	Wtgm	3	1218.5	344.2	**1119.3**	1601.4	1601.4	1601.4
Chim mon	LI	DW%	2	81.9	0.9	**81.9**	*	82.5	82.5
Chim mon	LI	FW%	3	76.7	1.5	**77.0**	78.0	78.0	78.0
Chim mon	LI	CD	3	0.04	0.01	**0.04**	0.05	0.05	0.05
Chim mon	LI	CU	3	1.35	0.40	**1.19**	1.81	1.81	1.81
Chim mon	LI	PB [2)]	0	*	*	*****	*	*	*
Chim mon	LI	ZN	3	3.08	0.51	**3.15**	3.55	3.55	3.55
Chim mon	LI	CB153	2	99.5	14.9	**99.5**	*	110.0	110.0
Chim mon	LI	PCB-sum7	3	168.5	118.3	**210.0**	260.4	260.4	260.4
Chim mon	LI	DDEPP	2	190.0	28.3	**190.0**	*	210.0	210.0
Chim mon	LI	HCB	2	8.0	0.1	**8.0**	*	8.1	8.1

[1)] 73 values below detection limit of 0.03/0.04 not included
[2)] all values below detection limit of 0.03/0.04 not included

Table 13B Fish liver from "Contaminated" area (st. 53B/D and 56D). Concentrations for metals in ppm (mg/kg) w.wt. and for organochlorines in µg/kg w.wt..

spp	tis	parameter	N-ww	M-ww	SD-ww	50-ww	75-ww	90-ww	MAX-ww
Gadu mor	LI	Lngmm	75	432.0	97.9	**430.0**	490.0	560.0	790.0
Gadu mor	LI	Wtgm	75	806.3	578.4	**696.0**	1044.0	1534.8	3791.0
Gadu mor	LI	DW%	62	44.4	15.8	**42.8**	59.0	64.6	71.6
Gadu mor	LI	FW%	69	28.6	19.9	**27.5**	47.3	54.4	68.5
Gadu mor	LI	CD	62	1.15	1.38	**0.65**	1.21	2.39	9.00
Gadu mor	LI	CU	62	12.67	10.77	**9.16**	16.88	27.50	48.80
Gadu mor	LI	PB	54	0.20	0.20	**0.14**	0.24	0.35	1.00
Gadu mor	LI	ZN	62	39.24	20.47	**32.45**	53.10	66.80	126.00
Gadu mor	LI	CB153	64	980.7	2788.1	**265.0**	530.0	1800.0	21000.0
Gadu mor	LI	PCB-sum7	64	2925.4	8694.6	**699.6**	1737.8	4864.0	65738.2
Gadu mor	LI	DDEPP	56	288.4	216.6	**275.0**	390.0	460.0	1300.0
Gadu mor	LI	HCB	69	6.1	5.8	**4.5**	8.5	15.0	25.0
Bros bro	LI	Lngmm	7	652.9	88.5	**664.0**	728.0	760.0	760.0
Bros bro	LI	Wtgm	7	3169.0	1197.0	**3071.5**	4158.4	4950.0	4950.0
Bros bro	LI	DW%	4	61.3	3.8	**61.5**	64.8	65.4	65.4
Bros bro	LI	FW%	7	52.0	4.1	**54.0**	55.0	55.0	55.0
Bros bro	LI	CD	7	0.15	0.10	**0.12**	0.24	0.30	0.30
Bros bro	LI	CU	7	4.10	1.68	**4.27**	5.83	6.00	6.00
Bros bro	LI	PB	7	0.39	0.15	**0.47**	0.52	0.54	0.50
Bros bro	LI	ZN	7	17.03	2.88	**16.00**	19.80	21.50	21.50
Bros bro	LI	CB153	7	978.6	587.4	**900.0**	1400.0	1900.0	1900.0
Bros bro	LI	PCB-sum7	7	2391.8	1378.0	**2167.5**	3405.0	4406.2	4406.2
Bros bro	LI	DDEPP	7	4014.3	2851.6	**3800.0**	5600.0	8900.0	8900.0
Bros bro	LI	HCB	7	9.7	2.7	**10.0**	11.0	14.0	14.0
Molv mol	LI	Lngmm	6	873.2	64.7	**898.5**	918.5	944.0	944.0
Molv mol	LI	Wtgm	6	3264.4	622.1	**3387.9**	3697.7	3989.0	3989.0
Molv mol	LI	DW%	5	61.9	8.5	**64.5**	67.0	68.2	68.2
Molv mol	LI	FW%	6	53.3	8.2	**56.5**	57.5	59.0	59.0
Molv mol	LI	CD	6	0.12	0.13	**0.08**	0.17	0.38	0.40
Molv mol	LI	CU	6	5.55	1.68	**5.04**	6.72	8.60	8.60
Molv mol	LI	PB	3	0.07	0.04	**0.06**	0.11	0.11	0.10
Molv mol	LI	ZN	6	23.13	4.03	**24.20**	26.85	27.00	27.00
Molv mol	LI	CB153	6	385.0	171.3	**320.0**	567.5	650.0	650.0
Molv mol	LI	PCB-sum7	6	1146.2	418.5	**998.7**	1567.5	1815.0	1815.0
Molv mol	LI	DDEPP	6	1716.7	617.8	**1550.0**	2200.0	2800.0	2800.0
Molv mol	LI	HCB	6	8.7	1.5	**9.1**	10.0	10.0	10.0
Chim mon	LI	Lngmm	3	807.7	48.3	**818.0**	850.0	850.0	850.0
Chim mon	LI	Wtgm	3	1248.9	126.0	**1251.4**	1373.6	1373.6	1373.6
Chim mon	LI	DW%	2	83.4	1.3	**83.4**	*	84.3	84.3
Chim mon	LI	FW%	3	78.7	2.9	**77.0**	82.0	82.0	82.0
Chim mon	LI	CD	3	0.07	0.03	**0.07**	0.10	0.10	0.10
Chim mon	LI	CU	3	1.71	0.33	**1.58**	2.08	2.08	2.10
Chim mon	LI	PB	3	0.07	0.03	**0.07**	0.10	0.10	0.10
Chim mon	LI	ZN	3	3.11	0.82	**2.98**	3.98	3.98	4.00
Chim mon	LI	CB153	3	350.0	235.2	**360.0**	580.0	580.0	580.0
Chim mon	LI	PCB-sum7	3	834.9	531.6	**902.0**	1329.8	1329.8	1329.8
Chim mon	LI	DDEPP	3	3466.7	1903.5	**3600.0**	5300.0	5300.0	5300.0
Chim mon	LI	HCB	3	11.0	1.7	**12.0**	12.0	12.0	12.0

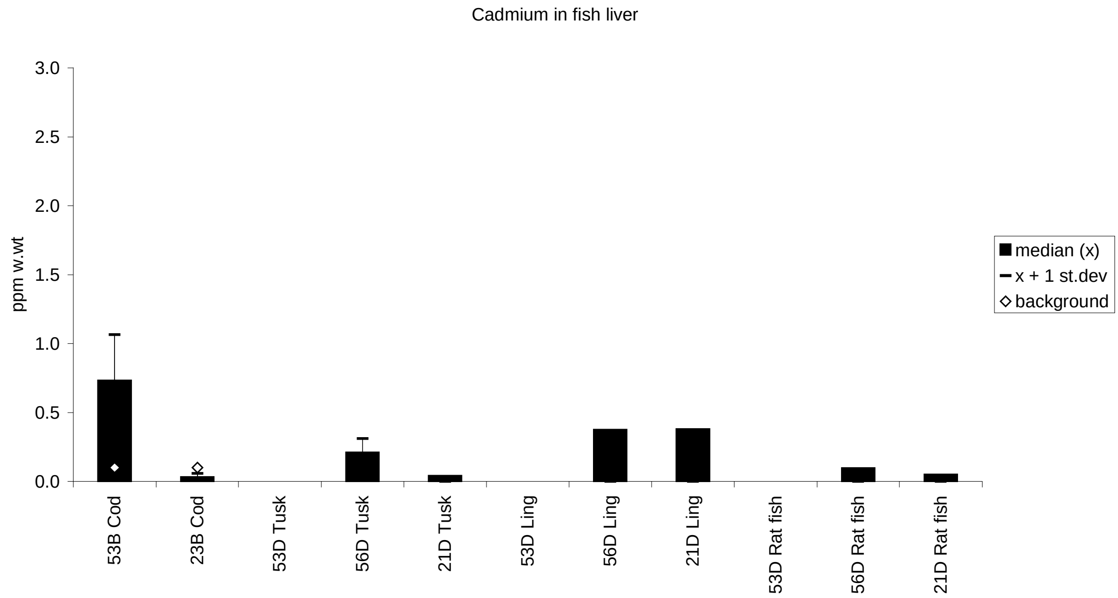
Table 13C. Contaminants in fish fillet from "Reference" area (st.23B and 21D). Concentrations for metals in ppm (mg/kg) w.wt. and for organochlorines in µg/kg w.wt..

spp	**tis**	**parameter**	N-ww	M-ww	SD-ww	**50-ww**	75-ww	90-ww	MAX-ww
Gadu mor	MU	Lngmm	90	545.3	96.4	**550.0**	610.0	670.0	750.0
Gadu mor	MU	Wtgm	90	1819.9	1009.0	**1665.7**	2477.1	3233.0	4938.0
Gadu mor	MU	DW%	75	19.8	0.8	**19.8**	20.3	20.6	21.9
Gadu mor	MU	FW%	15	0.34	0.04	**0.33**	0.37	0.39	0.42
Gadu mor	MU	HG	75	0.10	0.05	**0.09**	0.12	0.15	0.30
Gadu mor	MU	CB153	15	0.28	0.14	**0.23**	0.37	0.45	0.62
Gadu mor	MU	PCB-sum7	15	0.76	0.32	**0.61**	1.02	1.22	1.44
Gadu mor	MU	DDEPP	15	0.15	0.06	**0.15**	0.18	0.27	0.28
Gadu mor	MU	HCB	15	0.06	0.01	**0.06**	0.06	0.07	0.07
Bros bro	MU	Lngmm	5	624.2	97.8	**637.0**	703.0	768.0	768.0
Bros bro	MU	Wtgm	5	2878.5	1470.5	**2782.7**	4065.0	5290.0	5290.0
Bros bro	MU	DW%	4	21.1	0.4	**21.3**	21.4	21.4	21.4
Bros bro	MU	FW%	5	0.26	0.04	**0.26**	0.30	0.33	0.33
Bros bro	MU	HG	5	0.50	0.21	**0.38**	0.72	0.84	0.84
Bros bro	MU	CB153	5	0.98	0.61	**0.91**	1.55	1.90	1.90
Bros bro	MU	PCB-sum7	5	2.58	1.59	**2.33**	4.10	4.98	4.98
Bros bro	MU	DDEPP	5	1.03	0.65	**0.84**	1.70	1.90	1.90
Bros bro	MU	HCB	5	0.06	0.02	**0.06**	0.07	0.07	0.07
Molv mol	MU	Lngmm	5	891.2	143.4	**900.0**	1026.5	1047.0	1047.0
Molv mol	MU	Wtgm	5	3623.0	1229.1	**3940.0**	4702.5	4920.0	4920.0
Molv mol	MU	DW%	4	20.8	0.8	**21.1**	21.4	21.4	21.4
Molv mol	MU	FW%	5	0.35	0.04	**0.38**	0.38	0.38	0.38
Molv mol	MU	HG	5	0.43	0.26	**0.32**	0.70	0.81	0.81
Molv mol	MU	CB153	5	0.63	0.22	**0.51**	0.88	0.88	0.88
Molv mol	MU	PCB-sum7	5	1.93	0.68	**1.52**	2.67	2.70	2.70
Molv mol	MU	DDEPP	5	1.42	1.07	**1.30**	2.30	3.20	3.20
Molv mol	MU	HCB	5	0.09	0.04	**0.07**	0.14	0.14	0.14
Chim mon	MU	Lngmm	3	802.7	51.4	**773.0**	862.0	862.0	862.0
Chim mon	MU	Wtgm	3	1218.5	344.2	**1119.3**	1601.4	1601.4	1601.4
Chim mon	MU	DW%	2	17.6	0.1	**17.6**	*	17.7	17.7
Chim mon	MU	FW%	3	0.52	0.11	**0.58**	0.59	0.59	0.59
Chim mon	MU	HG	3	0.30	0.04	**0.31**	0.33	0.33	0.33
Chim mon	MU	CB153	3	0.19	0.06	**0.20**	0.24	0.24	0.24
Chim mon	MU	PCB-sum7	3	0.65	0.13	**0.64**	0.79	0.79	0.79
Chim mon	MU	DDEPP	3	0.38	0.10	**0.37**	0.48	0.48	0.48
Chim mon	MU	HCB	3	0.04	0.01	**0.04**	0.04	0.04	0.04

Table 13D. Contaminants in fish fillet from "Contaminated" area (st. 53B/D and 56D).
Concentrations for metals in ppm (mg/kg) w.wt. and for organochlorines in µg/kg w.wt..

spp	**tis**	**parameter**	N-ww	M-ww	SD-ww	**50-ww**	75-ww	90-ww	MAX-ww
Gadu mor	MU	Lngmm	90	432.0	97.0	**430.0**	490.0	560.0	790.0
Gadu mor	MU	Wtgm	90	806.3	568.8	**696.9**	1044.8	1534.8	3791.0
Gadu mor	MU	DW%	75	18.9	1.5	**19.2**	19.8	20.3	21.0
Gadu mor	MU	FW%	15	0.34	0.06	**0.34**	0.38	0.41	0.45
Gadu mor	MU	HG	75	0.39	0.27	**0.33**	0.51	0.75	1.46
Gadu mor	MU	CB153	15	6.94	9.91	**2.90**	9.00	17.00	38.00
Gadu mor	MU	PCB-sum7	14	23.73	34.31	**9.28**	32.40	59.25	126.95
Gadu mor	MU	DDEPP	15	3.20	4.89	**1.80**	3.20	5.30	20.00
Gadu mor	MU	HCB	15	0.06	0.03	**0.05**	0.09	0.11	0.11
Bros bro	MU	Lngmm	7	652.9	88.5	**664.0**	728.0	760.0	760.0
Bros bro	MU	Wtgm	7	3169.0	1197.0	**3071.5**	4158.4	4950.0	4950.0
Bros bro	MU	DW%	4	21.4	0.9	**21.6**	22.2	22.3	22.3
Bros bro	MU	FW%	7	0.27	0.02	**0.27**	0.28	0.31	0.31
Bros bro	MU	HG	7	2.28	1.10	**2.29**	3.48	3.50	3.50
Bros bro	MU	CB153	7	1.73	0.72	**1.90**	2.00	2.90	2.90
Bros bro	MU	PCB-sum7	7	4.50	1.59	**4.95**	5.16	6.87	6.87
Bros bro	MU	DDEPP	7	6.70	3.90	**7.80**	9.20	13.00	13.00
Bros bro	MU	HCB	4	0.04	0.00	**0.04**	0.05	0.05	0.05
Molv mol	MU	Lngmm	6	873.2	64.7	**898.5**	918.5	944.0	944.0
Molv mol	MU	Wtgm	6	3264.4	622.1	**3387.9**	3697.7	3989.0	3989.0
Molv mol	MU	DW%	5	21.1	0.6	**20.9**	21.6	22.0	22.0
Molv mol	MU	FW%	6	0.31	0.02	**0.30**	0.33	0.34	0.34
Molv mol	MU	HG	6	1.13	0.60	**1.11**	1.41	2.20	2.20
Molv mol	MU	CB153	6	1.03	0.71	**0.82**	1.43	2.40	2.40
Molv mol	MU	PCB-sum7	6	3.36	2.15	**2.70**	4.45	7.51	7.51
Molv mol	MU	DDEPP	6	4.88	3.26	**3.85**	6.95	11.00	11.00
Molv mol	MU	HCB	4	0.07	0.01	**0.07**	0.08	0.08	0.08
Chim mon	MU	Lngmm	3	807.7	48.3	**818.0**	850.0	850.0	850.0
Chim mon	MU	Wtgm	3	1248.9	126.0	**1251.4**	1373.6	1373.6	1373.6
Chim mon	MU	DW%	2	19.1	0.9	**19.1**	*	19.7	19.7
Chim mon	MU	FW%	3	0.59	0.03	**0.58**	0.63	0.63	0.63
Chim mon	MU	HG	3	0.89	0.13	**0.82**	1.04	1.04	1.04
Chim mon	MU	CB153	3	0.97	0.82	**0.64**	1.90	1.90	1.90
Chim mon	MU	PCB-sum7	1	4.58	*	**4.58**	*	4.58	4.58
Chim mon	MU	DDEPP	3	11.73	9.77	**6.50**	23.00	23.00	23.00
Chim mon	MU	HCB	2	0.06	0.01	**0.06**	*	0.07	0.07

A



B

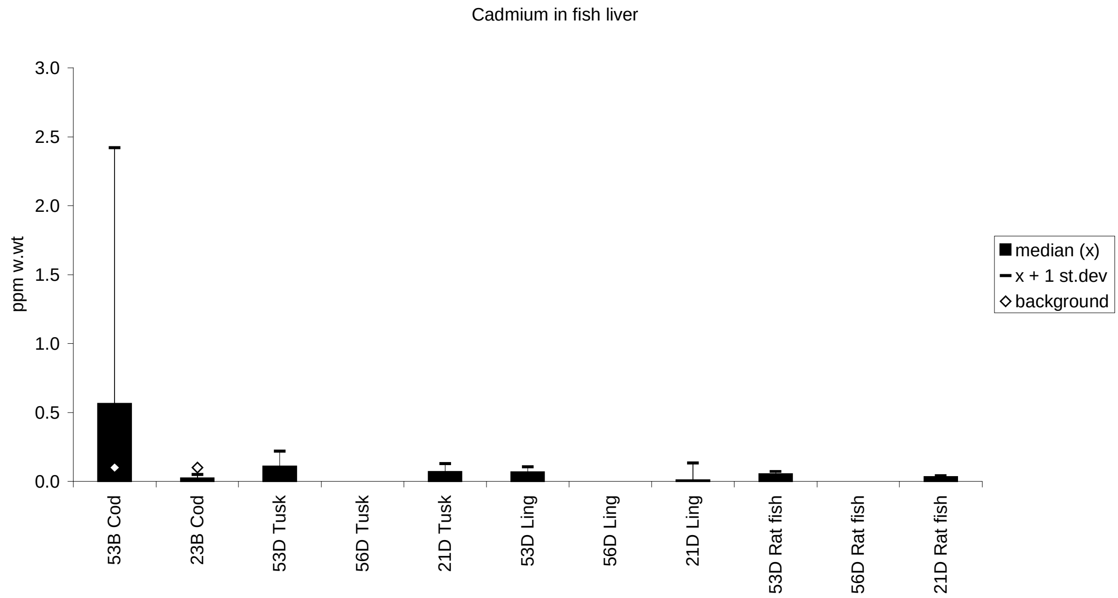
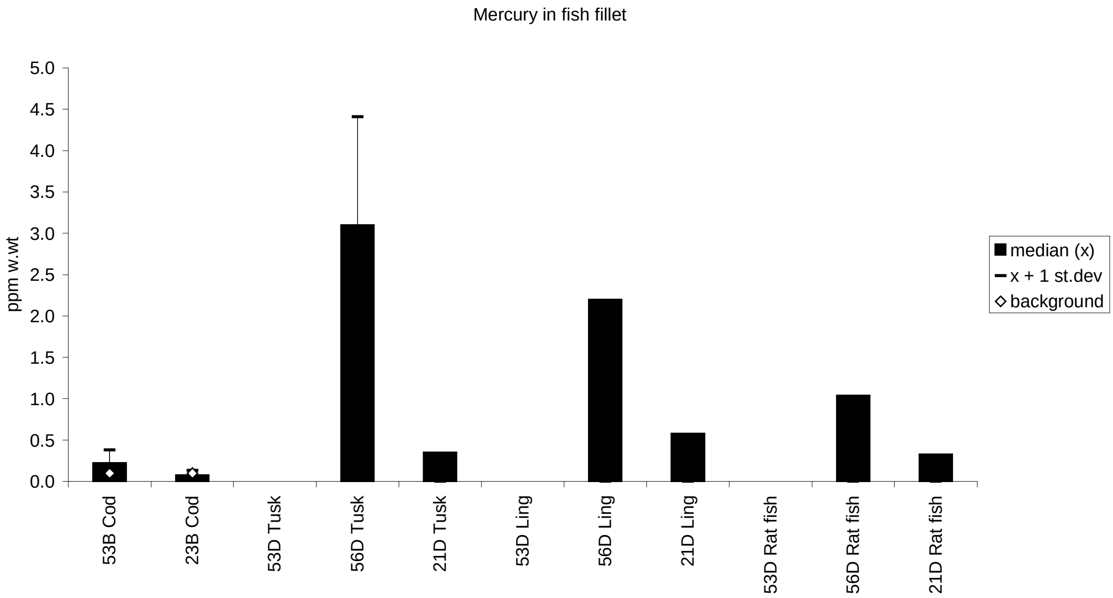


Figure 39. Median, standard deviation and provisional "high background" concentration for cadmium in fish liver from cod (reference) and deep-water fish 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F). NB: for 2000-data the deep-water fish were caught in April 2000 and are compared to cod caught in October 1999.

A



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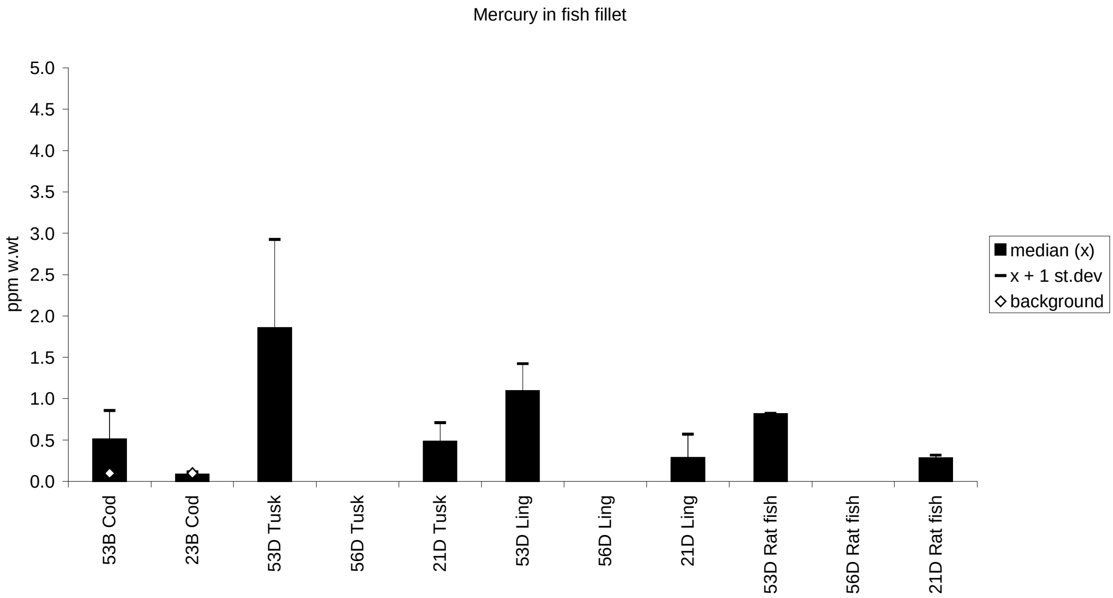
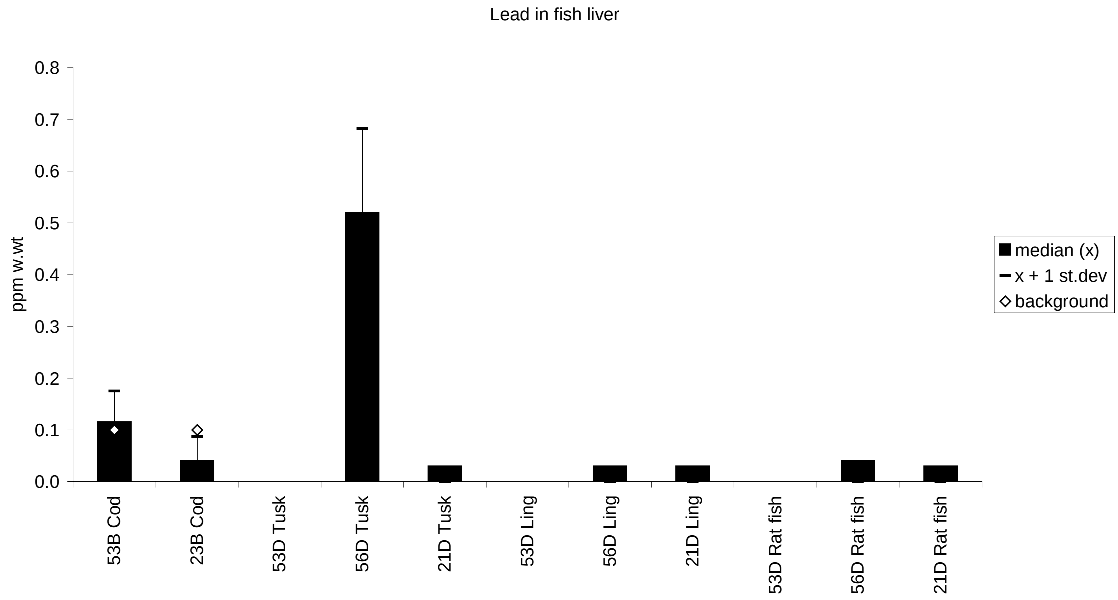


Figure 40. Median, standard deviation and provisional "high background" concentration for mercury in fish fillet from cod (reference) and deep-water fish 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F). NB: for 2000-data the deep-water fish were caught in April 2000 and are compared to cod caught in October 1999.

A



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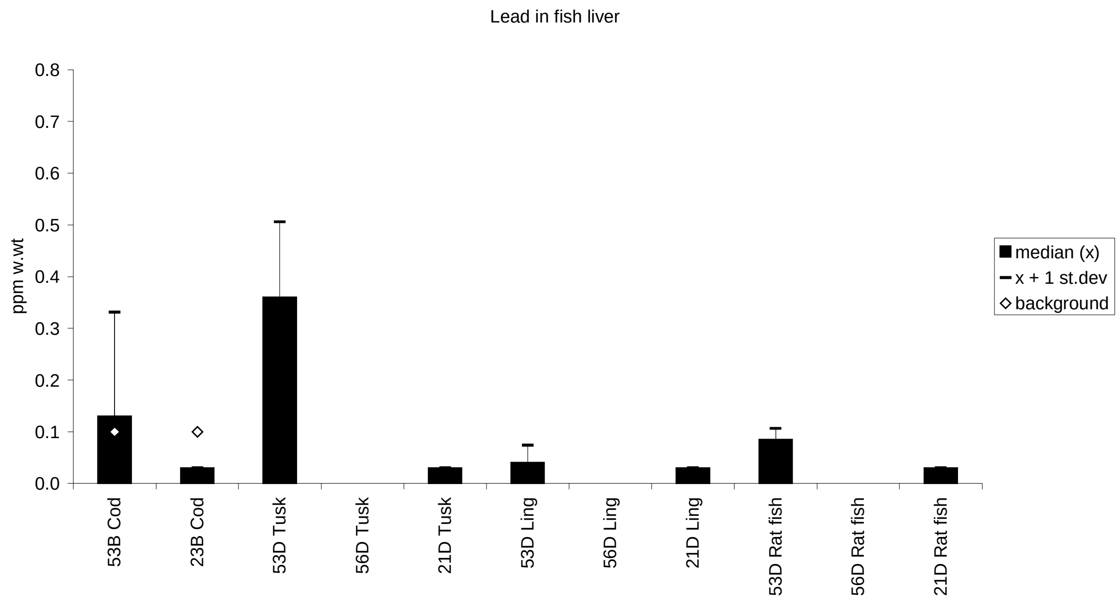
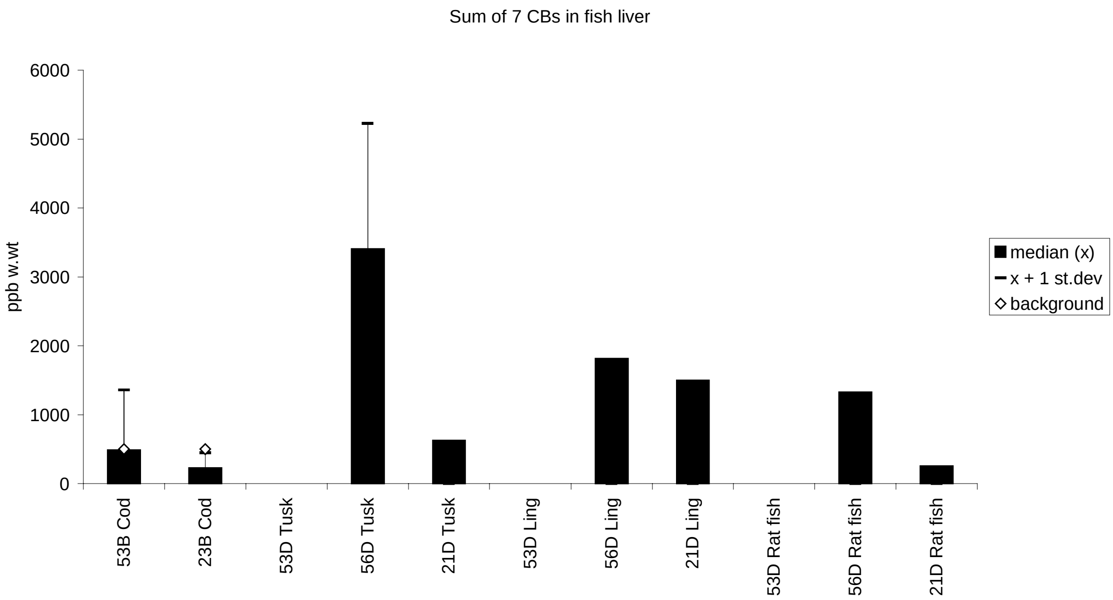


Figure 41. Median, standard deviation and provisional "high background" concentration for lead in fish liver from cod (reference) and deep-water fish 2000 (**A**) and 2001 (**B**), ppm wet weight (see maps in Appendix F). NB: for 2000-data the deep-water fish were caught in April 2000 and are compared to cod caught in October 1999.

A



B

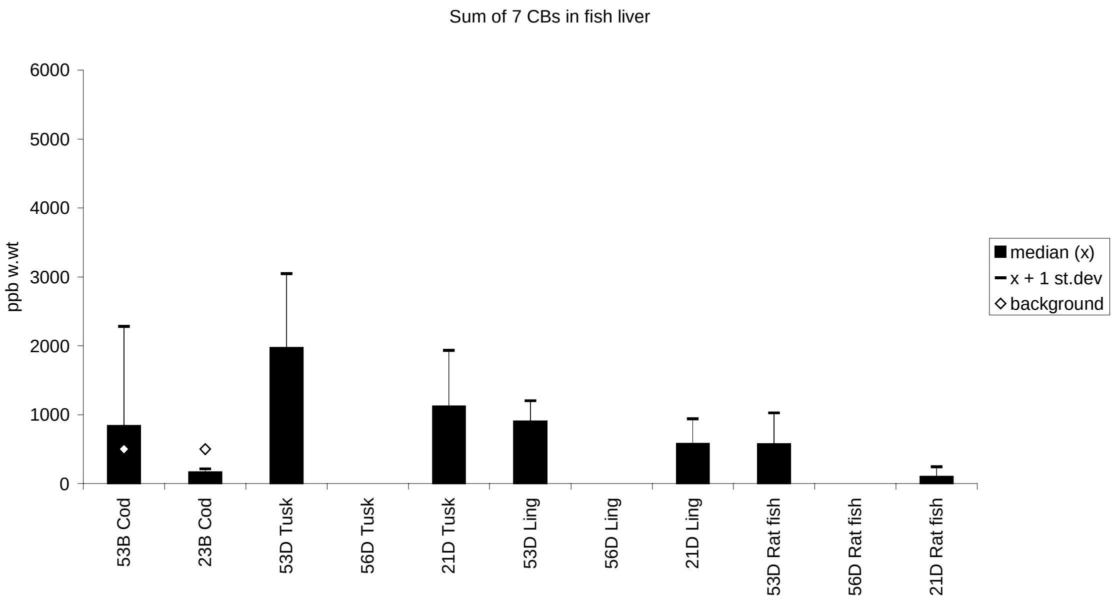
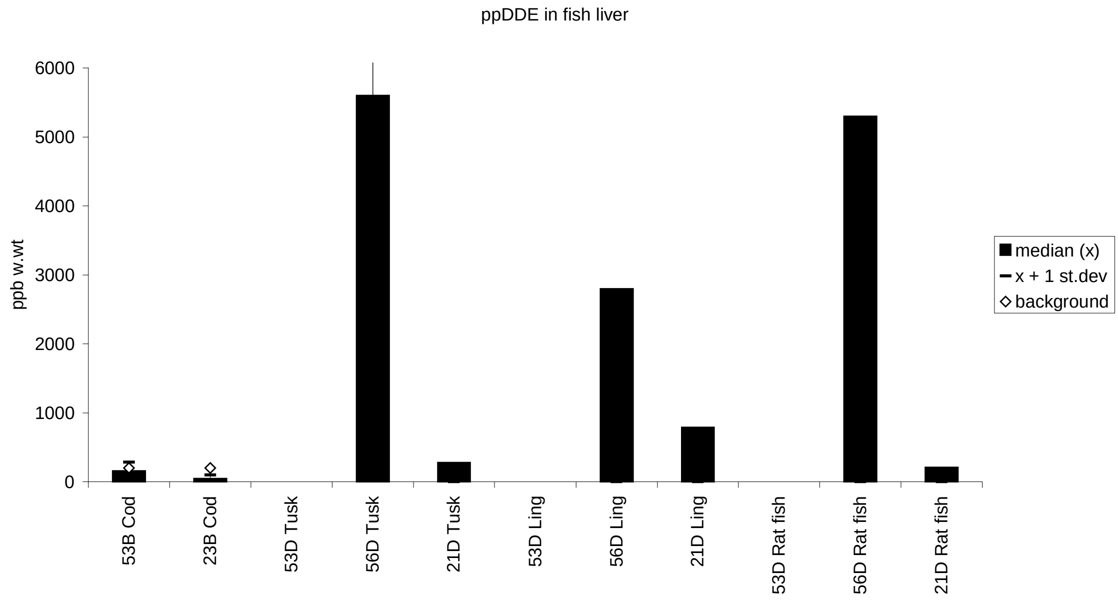


Figure 42. Median, standard deviation and provisional "high background" concentration for sum of 7 PCBs (CB-28, -52, 101, -118, -138, -153 and -180) in fish liver from cod (reference) and deep-water fish 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F). NB: for 2000-data the deep-water fish were caught in April 2000 and are compared to cod caught in October 1999.

A



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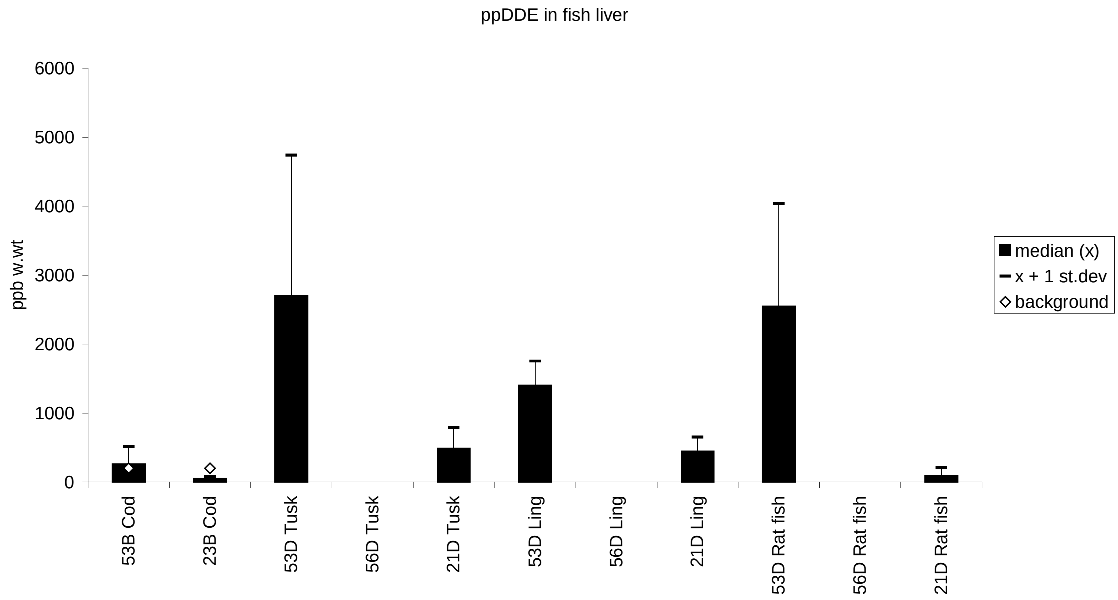
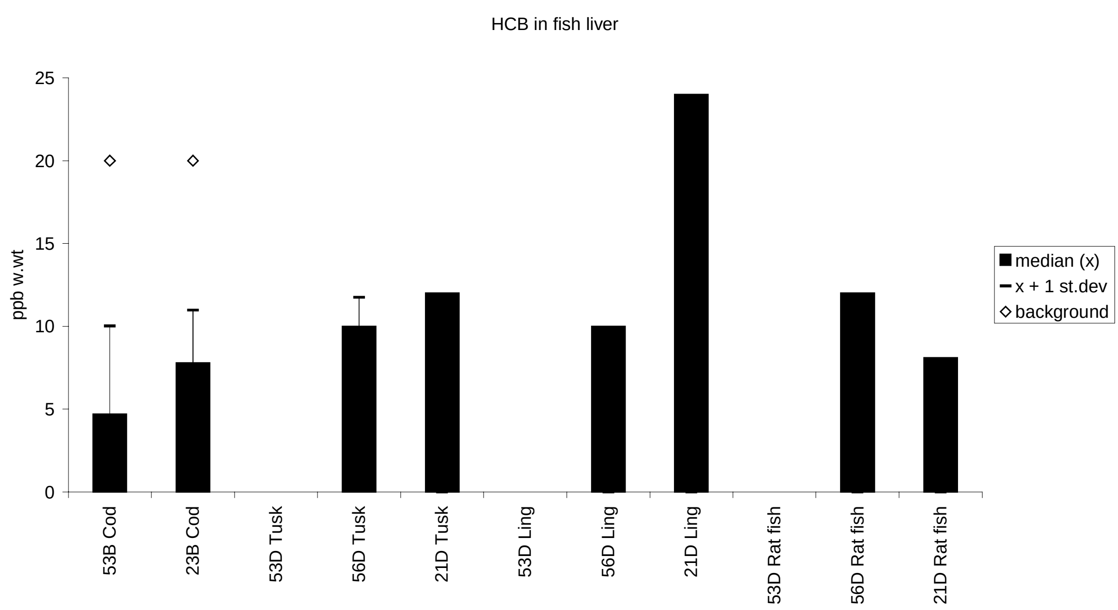


Figure 43. Median, standard deviation and provisional "high background" concentration for ppDDE (DDEPP) in fish liver from cod (reference) and deep-water fish 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F). (See also footnote in Table 7). NB: for 2000-data the deep-water fish were caught in April 2000 and are compared to cod caught in October 1999.

A



B

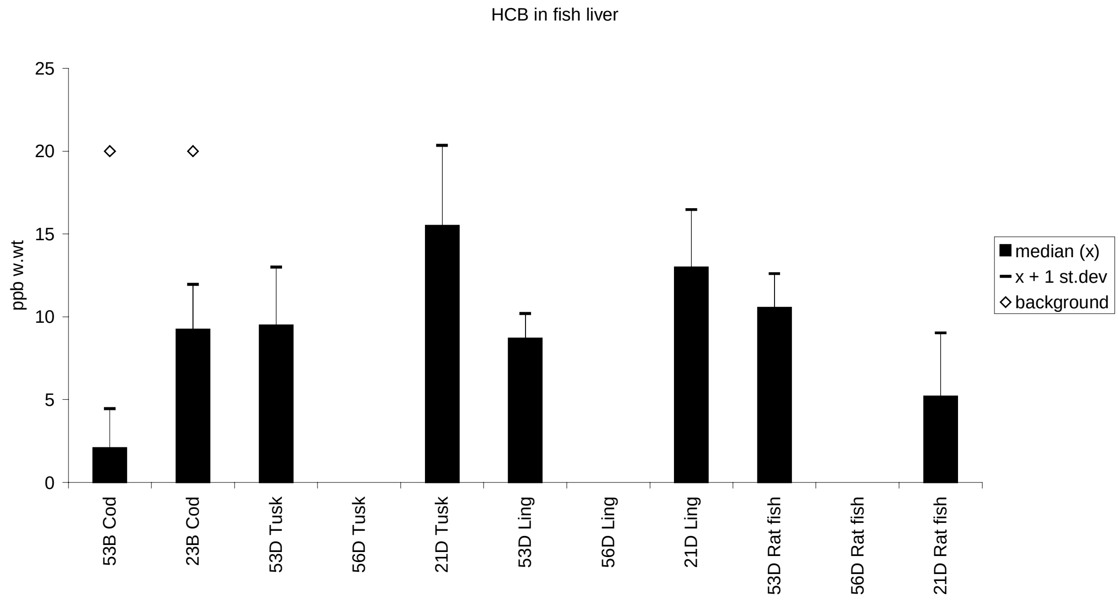


Figure 44. Median, standard deviation and provisional "high background" concentration for HCB in fish liver from cod (reference) and deep-water fish 2000 (**A**) and 2001 (**B**), ppb wet weight (see maps in Appendix F). NB: for 2000-data the deep-water fish were caught in April 2000 and are compared to cod caught in October 1999.